

**UNCLASSIFIED**

**AD 740 990**

# **ENCAPSULATION**

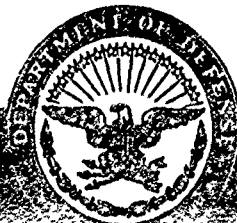
## **A DDC BIBLIOGRAPHY**

**DDC-TAS-72-19-1**

**MAY 1972**

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Security Classification

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Transistors						
Manufacturing Methods						
Films						
Aerosols						
Lacquer Films						
Coatings						
Electronic Equipment						
Integrated Circuits						
Mica						
Microminiaturization(Electronics)						
Naval Equipment						
Packaged Circuits						
Packaging						
Dielectrics						

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AD-743 990

# **ENCAPSULATION**

## **A DDC BIBLIOGRAPHY**

**DDC-TAS-72-19-1**

**October 1955 - September 1971**

**MAY 1972**

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**DEFENSE SUPPLY AGENCY**

**CAMERON STATION**

**ALEXANDRIA, VIRGINIA 22314**

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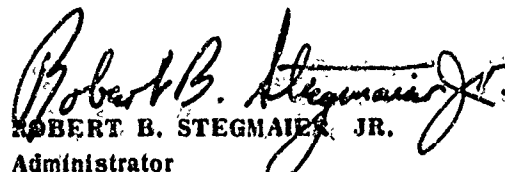
## FOREWORD

This bibliography contains the pertinent (weighted) references in the DDC collection on *Encapsulation*. The time coverage is January 1953 to January 1972. In addition to the weighted references, it also contains selective citations related to the subject.

Corporate Author-Monitoring Agency, Subject, Title, and Personal Author Indexes are included.

BY ORDER OF THE DIRECTOR, DEFENSE SUPPLY AGENCY

OFFICIAL

  
ROBERT B. STEGMAIER, JR.  
Administrator  
Defense Documentation Center

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PERSONAL AUTHOR.....	P-1

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD- 96 112

ARMY ELECTRONICS LABS FORT MONMOUTH N J

ENCAPSULATING RESINS AND POTTING COMPOUNDS

(U)

OCT 55 JV LINDEN, ERIK G.  
REPT. NO. ER E 1101

UNCLASSIFIED REPORT

DESCRIPTORS: \*EMBEDDING SUBSTANCES, \*PLASTICS;  
ENCAPSULATION

(H)

1  
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/ZZZHT

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-251 485

GENERAL ELECTRIC CO UTICA N Y

RESEARCH AND DEVELOPMENT OF THERMOCOUPLE ENERGY  
CONVERTERS

(U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 4, 29 DEC

60-28 JAN 61

AUG 60 9P

CONTRACT: DA-18-108-405-CML-941, DA-18-108-CML-  
6561

UNCLASSIFIED REPORT

DESCRIPTORS: •ENCAPSULATION, •THERMOCOUPLES, DESIGN,  
LEAD COMPOUNDS, PRODUCTION, TELLURIDES, THEORY

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-255 010

STANFORD RESEARCH INST MENLO PARK CALIF

ENCAPSULATED AEROSOLS

(U)

IV ROBBINS, ROBERT C.;

UNCLASSIFIED REPORT

DESCRIPTORS: \*AEROSOLS, \*CHEMICAL WARFARE AGENTS,  
\*COATINGS, \*ENCAPSULATION, AMMONIUM COMPOUNDS,  
BENZENEBORONIC ACID, CHLORIDES, COAGULATION,  
CONDENSATION, DIOXIDES, ELECTROSTATICS, ETHYLENES,  
FILMS, LIQUIDS, NITROGEN COMPOUNDS, PHOSPHATES,  
PHOSPHITES, PHOSPHORIC ACIDS, PHTHALATES,  
POLYMERIZATION, POLYMERS, SOLIDS, VAPORS

(U)

VARIOUS METHODS OF AEROSOL ENCAPSULATION WERE  
STUDIED: (1) LIQUID PHASE MICROENCAPSULATION,  
(2) CONDENSATION, AND (3) COAGULATION.  
AEROSOL ENCAPSULATION BY CONDENSATION, USING THE  
CORE PARTICLES OR DROPLETS AS CONDENSATION NUCLEI,  
PROVED TO BE A GENERALLY SUCCESSFUL TECHNIQUE.  
COAGULATION WITH INERTIAL FORCES, USING SIMPLE LOW-  
POWERED DEVICES, SHOWED LITTLE PROMISE AS A PRACTICAL  
AEROSOL ENCAPSULATION METHOD. COAGULATION WITH  
ELECTROSTATIC CHARGING OF THE PARTICLES WAS ONLY  
PARTIALLY SUCCESSFUL IN SOLID ON LIQUID AND LIQUID ON  
LIQUID SYSTEMS, BUT WORKED QUITE WELL IN  
ENCAPSULATING SOLID CORES WITH LIQUID FILMS. LIQUID  
PHASE MICROENCAPSULATION WAS QUITE SUCCESSFUL, WHERE  
APPLICABLE. A NUMBER OF LIQUID CORES WERE  
SUCCESSFULLY POLYMERIZED. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-255 962

NAVAL ORDNANCE TEST STATION CHINA LAKE CALIF

EFFECT OF PROCESS VARIABLES ON THE DIMENSIONS AND  
QUALITY OF EXTRUSION-COATED PROPELLANT GRAINS (U)

DEC 60 IV METCALF, H.F.; SUTHERLAND, RODNEY;  
REPT. NO. TP 2597  
MONITOR: NAVWEPS 7604

UNCLASSIFIED REPORT

DESCRIPTORS: •COATINGS, •ENCAPSULATION, •EXTRUSION,  
•PLASTIC COATINGS, •PROPELLANT GRAINS, CELLULOSE, ETHYL  
CELLULOSE, MACHINE TOOLS, MANUFACTURING METHODS,  
PROCESSING, QUALITY CONTROL, SOLID ROCKET PROPELLANTS (U)

THE SECOND PHASE OF AN EXPERIMENT TO EVALUATE AN  
EXTRUSION-COATING PROCESS FOR INHIBITING  
ROCKET PROPELLANT GRAINS WITH ETHYLCELLULOSE IS  
DESCRIBED. THE OBJECTIVES OF THIS PHASE OF THE  
EXPERIMENT ARE TO APPLY A SET OF CHOSEN OPERATING  
CONDITIONS IN THE 2 1/2-INCH EXTRUDER AND TO CONSIDER  
THE EFFECT OF EIGHT ADDITIONAL PROCESS FACTORS ON THE  
QUALITY AND DIMENSIONS OF THE INHIBITED PROPELLANT  
GRAINS. DATA RESULTING FROM THESE APPLICATIONS ARE  
PRESENTED IN TABULAR AND GRAPHICAL FORM, AND AN  
INTERPRETATION OF THE DATA IS INCLUDED IN THE TEXT.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-257 829

WESTERN ELECTRIC CO INC WINSTON-SALEM N C

INDUSTRIAL PREPAREDNESS STUDY. LACQUER FILM  
CAPACITORS

(U)

MAY 51 YV LLOYD, H.E.;  
CONTRACT: DA36 029SC81268

UNCLASSIFIED REPORT

DESCRIPTORS: \*CAPACITORS, ALUMINUM COATINGS, CELLULOSE  
ACETATES, COATINGS, DIELECTRIC FILMS, ELECTRIC  
INSULATION, ENCAPSULATION, FILMS, MANUFACTURING METHODS,  
METAL COATINGS, PAPER, PLASTIC COATINGS, PRODUCTION,  
QUALITY CONTROL, RESISTANCE (ELECTRICAL), TESTS, THIN  
FILMS (STORAGE DEVICES), VARNISHES (U)

IDENTIFIERS: THIN FILMS, THIN FILMS  
ELECTRONICS (M)

EFFORT HAS BEEN DIRECTED PRIMARILY TOWARD  
IMPROVEMENTS IN THE QUALITY OF THE LACQUER FILM  
CAPACITORS. DIFFICULTIES EXPERIENCED WITH  
DETERIORATION OF INSULATION RESISTANCE AND EFFECTIVE  
SERIES RESISTANCE UPON THE APPLICATION OF HEAT HAVE  
BEEN RESOLVED. ALSO, EXCESSIVE CAPACITANCE GROWTH  
HAS BEEN BROUGHT UNDER CONTROL. DATA WERE PRESENTED  
TO SHOW THE PRESENT LEVEL OF QUALITY. ALSO,  
PREVIOUSLY COLLECTED DATA IS USED TO MAKE COMPARISONS  
WITH THE CURRENT EXPERIENCE. PREPRODUCTION SAMPLES  
FOR THE 1.0 AND 0.1 MICROFARAD SIZES ARE UNDERGOING  
ELECTRICAL TEST. SAMPLES FOR THE 5.6 MICROFARAD  
SIZE ARE IN AN ADVANCED STAGE OF PRODUCTION.  
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-258 395

SYNTHETIC MICA CO WEST CALDWELL N J

DEVELOPMENT OF ULTRA HIGH TEMPERATURE DIELECTRIC  
MATERIALS FOR EMBEDDING AND ENCAPSULATING ELECTRONIC  
COMPONENTS (U)

NOV 60 IV BARR, F. A.; MCCARTHY, J. P.;  
CONTRACT: NOBS78714

UNCLASSIFIED REPORT

DESCRIPTORS: • EMBEDDING SUBSTANCES, • ENCAPSULATION,  
• MICA, ALUMINUM COMPOUNDS, BINDERS, COATINGS,  
DIELECTRICS, ELECTRICAL PROPERTIES, ELECTRONIC  
EQUIPMENT, GLASS, HIGH-TEMPERATURE RESEARCH, MATERIALS,  
PHOSPHATES, PHYSICAL PROPERTIES, POROSITY (U)

INCREASING THE CONCENTRATION OF AQUEOUS ALUMINUM  
PHOSPHATE DECREASED THE POROSITY OF PHOSPHATE-BONDED  
SYNTHETIC MICA COMPOUND. POROSITY CAN BE DECREASED  
BY GLASS COATINGS BUT THE THERMAL EXPANSION OF THE  
GLASS MUST MATCH THAT OF THE SAMPLE. A VOLUME  
SHRINKAGE OF APPROXIMATELY 7% WAS CALCULATED FOR A  
STANDARD PHOSPHATE-BONDED SYNTHETIC MICA COMPOUND.  
INITIAL RESULTS OF ELECTRICAL PROPERTIES AT  
ELEVATED TEMPERATURES INDICATE THAT THE PHOSPHATE-  
BONDED SYNTHETIC MICA SYSTEMS ARE SUITABLE FOR 500  
C USE. COMMERCIAL ELECTRONIC COMPONENTS  
(MAGNETIC AMPLIFIERS, CAPACITORS, AND SMALL  
MOTORS) WERE SUCCESSFULLY POTTED AND ENCAPSULATED  
WITH THE BONDED SYNTHETIC MICA COMPOUND.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-260 926

STANFORD RESEARCH INST MENLO PARK CALIF

ENCAPSULATED AEROSOLS

(U)

IV ROBBINS, ROBERT C.;

UNCLASSIFIED REPORT

DESCRIPTORS: •AFROSOLS, •ENCAPSULATION, ACETATES, ACRYLIC RESINS, BUTYL RADICALS, CHEMICAL WARFARE AGENTS, COATINGS, CONDENSATION, CONTAINERS, ETHYLENES, FILMS, LIQUIDS, NITROCELLULOSE, PHOSPHITES, POLYMERIZATION, POLYMERS, RUBBER, VAPORS, VINYL RADICAL (U)

CONDENSATION POLYMERIZATION OF A NUMBER OF VAPOR PHASE MONOMERS, AS A MEANS OF ENCAPSULATING AEROSOL DROPLETS, WAS STUDIED. THE BEST OF THESE, VINYL ACETATE, POLYMERIZED RAPIDLY AND PRODUCED SOME POLYMER FILM ENCAPSULATION OF THE AEROSOL DROPLETS. A TWO-STAGE MICROCAPSULE GENERATOR WAS DESIGNED, FABRICATED, AND OPERATED. DIBUTYL PHOSPHITE DROPLETS OF ABOUT 5-MICRON DIAMETER WERE ENCAPSULATED WITH A LIQUID GLYCERINE FILM. BY USING SOLUTIONS OF ENCAPSULATING MATERIAL, THE GENERATOR ALSO PRODUCED MICROCAPSULES OF DIBUTYL PHOSPHITE IN POLYETHYLENE, NITROCELLULOSE, AND NATURAL RUBBER. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-261 938

BELL TELEPHONE LABS INC WHIPPANY N J

ENGINEERING SERVICES ON TRANSISTORS

(U)

MAY 61 IV ATALLA, M.M.; DODSON, G.A.;  
CONTRACT: DA36 039SC85352

UNCLASSIFIED REPORT

DESCRIPTORS: ♦DIODES, ♦TRANSISTOR AMPLIFIERS,  
♦TRANSISTORS, AGING (PHYSIOLOGY), DESIGN, ELECTRICAL  
PROPERTIES, ENCAPSULATION, FAILURE (MECHANICS),  
GERMANIUM, IMPURITIES, MEASUREMENT, MICROWAVE EQUIPMENT,  
RELIABILITY, SILICON, STORAGE, STRESSES, SWITCHING  
CIRCUITS, TEMPERATURE, TEST METHODS, TESTS (U)

STUDIES AND INVESTIGATIONS WERE CONTINUED ON  
TRANSISTORS AND TRANSISTOR-LIKE DEVICES WITH A VIEW  
TOWARD DEMONSTRATING AND INCREASING THE  
PRACTICABILITY OF THEIR USE IN OPERATING EQUIPMENT.  
STATUS REPORTS ARE PRESENTED ON: (1)  
ACCELERATED STEP-STRESS AGING OF DIODES, (2) A  
3000-MC MICROWAVE GERMANIUM TRANSISTOR, (3) A 1-  
WATT, 1000 MC GERMANIUM TRANSISTOR, (4)  
INTEGRATED CIRCUIT DEVELOPMENT, (5) TRANSISTOR  
REQUIREMENTS FOR DCTL, AND (6) AN ANALYSIS OF  
STORAGE TIME BEHAVIOR OF DIFFUSED EPITAXIAL SILICON  
TRANSISTORS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-265 314

STANFORD RESEARCH INST MENLO PARK CALIF

ENCAPSULATED AEROSOLS

(U)

IV ROBBINS, ROBERT C.;

UNCLASSIFIED REPORT

DESCRIPTORS: •AEROSOLS, •ENCAPSULATION, AEROSOL GENERATORS, BUTYL RADICALS, CHEMICAL WARFARE AGENTS, COATINGS, DESIGN, DROPS, EFFECTIVENESS, ETHYLENES, LIQUIDS, PHOSPHITES, POLYMERS, RUBBER, WAXES (U)

A TWO-STAGE MICROCAPSULE GENERATOR HAS BEEN UTILIZED TO PRODUCE A VARIETY OF LIQUID CORE MICROCAPSULES. A NUMBER OF OPERATIONAL AND DESIGN CHANGES HAVE BEEN MADE TO IMPROVE THE PERFORMANCE OF THE GENERATOR AND TO INCREASE ITS VERSATILITY. THE GENERATOR HAS BEEN USED TO PROVIDE MICROCAPSULES OF DIBUTYL PHOSPHITE IN RUBBER, DIBUTYL PHOSPHITE IN PARAFFIN, AND DIBUTYL PHOSPHITE IN POLYETHYLENE. STUDIES WERE MADE OF THE EFFECT OF FILM COATING ON THE EVAPORATION RATE OF DIBUTYL PHOSPHITE MICRODROPLETS. AN INVESTIGATION WAS MADE OF THE EFFECT OF SOLUTION CONCENTRATION ON COAT THICKNESS IN SPRAYDRIED MICROCAPSULES. NOZZLE DESIGN WAS FOUND TO BE A CRITICAL PARAMETER. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-265 461

GENERAL ELECTRIC CO SYRACUSE N Y

OPTIMIZATION OF THERMOELECTRIC ENERGY CONVERTERS (U)

DEC 60 1V KLEIN, PHILIPP H.;

CONTRACT: NOBS78402

UNCLASSIFIED REPORT

DESCRIPTORS: \*ELECTRIC POWER PRODUCTION; \*GENERATORS;  
\*THERMAL CONDUCTIVITY; \*THERMOELECTRICITY; ANTIMONY  
ALLOYS, BISMUTH ALLOYS, CALCIUM COMPOUNDS, CHROMIUM  
COMPOUNDS, ENCAPSULATION, HEAT TRANSFER, INTERMETALLIC  
COMPOUNDS, LEAD COMPOUNDS, MAGNESIUM COMPOUNDS,  
MATERIALS, SILICATES, TANTALUM, TELLURIDES, THERMAL  
INSULATION (U)

DESCRIPTORS: \*THERMOELECTRICITY; \*GENERATORS;  
\*THERMAL CONDUCTIVITY, ENCAPSULATION, LEAD  
COMPOUNDS, BISMUTH ALLOYS.  
CONSIDERATION OF THERMAL SYSTEM NO. 1 WAS  
CONTINUED. THE SOURCE OF HEAT FOR THIS SYSTEM IS  
SATURATED STEAM AT 533 K (500 F), AND THE HEAT  
SINK IS SEA WATER AT 291 K (65 F). RESULTS FOR  
FORCED-CONVECTION COOLING HAVE BEEN COMPARED WITH  
THOSE FOR FREE-CONVECTION COOLING. IN ADDITION,  
THE POSSIBLE IMPROVEMENTS IN PERFORMANCE THAT MAY  
RESULT FROM USE OF BETTER THERMOELECTRIC MATERIALS  
THAN ARE CURRENTLY AVAILABLE HAVE BEEN COMPUTED.  
THESE RESULTS WERE OBTAINED WITH THE AID OF A  
COMPUTER PROGRAM DESIGNATED NOBS-2. PROGRESS WAS  
ALSO MADE IN THE PREPARATION OF COMPUTER PROGRAM  
NOBS-3, WHICH PROVIDES A MORE ACCURATE  
REPRESENTATION OF THE LOSSES IN ELECTRICAL  
CONDUCTORS, ELECTRICAL CONTACTS, AND THERMAL SHUNTS  
THAN IS POSSIBLE WITH THE NOBS-2 PROGRAM. IN  
ADDITION, GENERAL CHARACTERISTICS HAVE BEEN EVOLVED  
FOR THE NEXT THERMAL SYSTEM TO BE ANALYZED.  
(AUTHOR) (U)



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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-265 499

SYNTHETIC MICA CO. WEST CALDWELL N J

DEVELOPMENT OF ULTRA HIGH TEMPERATURE DIELECTRIC  
MATERIALS FOR EMBEDDING AND ENCAPSULATING ELECTRONIC  
COMPONENTS (U)

MAY 61 IV BARR, F.A.; MCCARTHY, J.P.;  
CONTRACT: NOBS78714

UNCLASSIFIED REPORT

DESCRIPTORS: •DIELECTRICS; •ELECTRONIC EQUIPMENT;  
•EMBEDDING SUBSTANCES; •ENCAPSULATION; •MICA; ADHESIVES;  
ALUMINATES, ALUMINUM COMPOUNDS, BINDERS, BORON  
COMPOUNDS, COATINGS, DIELECTRIC PROPERTIES, GLASS;  
GYPSUM, HIGH-TEMPERATURE RESEARCH, MEASUREMENT,  
MECHANICAL PROPERTIES, PARTICLES, PHOSPHATES, PHYSICAL  
PROPERTIES, POROSITY, THERMAL EXPANSION;  
THERMODYNAMICS (U)

PHOSPHATE SYNTHETIC MICA WAS INVESTIGATED AS A  
DIELECTRIC MATERIAL FOR ENCAPSULATING AND EMBEDDING  
ELECTRONIC COMPONENTS FOR 500 C USE. PHYSICAL  
PROPERTIES OF THE SYSTEM WERE DETERMINED AND FOUND TO  
BE SUITABLE FOR HIGH TEMPERATURE USE. VARIOUS  
METHODS OF REDUCING POROSITY WERE INVESTIGATED  
INCLUDING DRY PRESSING, GLASS COATING, ADDITIVES AND  
VARIOUS PHOSPHATE BONDS. THE USE OF A DEVITRIFIED  
GLASS SEALING CEMENT AS A COATING FOR THE PHOSPHATE  
SYNTHETIC MICA RESULTED IN A COMPOSITE MATERIAL  
CURED BELOW 500 C, HAVING GOOD PHYSICAL PROPERTIES  
WITH WATER ABSORPTION LESS THAN 1%. COMMERCIAL  
CAPACITORS, TRANSFORMERS, AND MOTORS WERE  
ENCAPSULATED AND TESTED. PROTOTYPE HIGH  
TEMPERATURE RESISTORS WERE CONSTRUCTED AND  
ENCAPSULATED FOR 500 C APPLICATIONS USING CERAMO-  
PLASTIC INJECTION MOLDING TECHNIQUES IN COMBINATION  
WITH THE PHOSPHATE-MICA DIELECTRIC MATERIAL.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-265 857

GENERAL ELECTRIC CO SYRACUSE N Y

OPTIMIZATION OF THERMOELECTRIC ENERGY CONVERTERS (U)

FEB 61 IV LUFT, L.;  
CONTRACT. NOBS78402

UNCLASSIFIED REPORT

DESCRIPTORS: \*ELECTRIC POWER PRODUCTION, \*POWER SUPPLIES, \*THERMOELECTRICITY, ANTIMONY ALLOYS, ARSENIDES, BISMUTH ALLOYS, CALCIUM COMPOUNDS, CERAMIC MATERIALS, CHEMICAL PROPERTIES, CHROMIUM COMPOUNDS, CRYSTAL STRUCTURE, DESIGN, ELECTRICAL PROPERTIES, ENCAPSULATION, GENERATORS, HALL EFFECT, HEAT, HEAT TRANSFER, INTERMETALLIC COMPOUNDS, LEAD COMPOUNDS, MAGNESIUM COMPOUNDS, MEASUREMENT, MECHANICAL PROPERTIES, OXIDES, SELENIDES, SOURCES, TANTALUM, TELLURIDES, TESTS (U)

THE WORK ON A SELECTED SYSTEM, DESIGNATED THERMAL SYSTEM NO. 1, WAS COMPLETED USING A COMPUTER PROGRAM. THERMAL SYSTEM NO. 1 IS BASED ON SATURATED STEAM AT 523 K AS THE HEAT SOURCE AND 291 K WATER AS THE HEAT SINK. MGO-TIO2 CERAMIC WAS MADE INTO CAP ULE BODIES AND USED FOR SUCCESSFUL ENCAPSULATION OF LEAD TELLURIDE. SEEBECK COEFFICIENT OF MG2SB2 WAS MEASURED IN THE 300 TO 1250 K TEMPERATURE RANGE, THE VALUES RANGING FROM 100 TO 159 MICROVOLTS PER DEGREES K. ELECTRICAL MEASUREMENTS WERE PERFORMED ON CRSBO.9SE0.1, INCLUDING SEEBECK COEFFICIENT AND ELECTRICAL RESISTANCE. A NUMBER OF II-IV COMPOUNDS WAS PREPARED AND THEIR THERMOELECTRIC PROPERTIES MEASURED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-265 866

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

ENCAPSULATING, POTTING, AND EMBEDDING MATERIALS FOR  
ELECTRONIC COMPONENTS AND MODULES. AN ANNOTATED  
BIBLIOGRAPHY

(U)

AUG 61 1V OWENS, GEORGE E.;  
REPT. NO. SB 61 50  
CONTRACT: AFO4 647 787

UNCLASSIFIED REPORT

DESCRIPTORS: •BIBLIOGRAPHIES, •EMBEDDING SUBSTANCES,  
•ENCAPSULATION, •INSULATING MATERIALS, ELECTRIC  
INSULATION, ELECTRONIC EQUIPMENT

(U)

THIS BIBLIOGRAPHY RESULTS FROM A SEARCH FOR  
INFORMATION ON MATERIALS USED FOR ENCAPSULATING,  
POTTING, AND EMBEDDING ELECTRONIC COMPONENTS.  
THERE ARE 97 REFERENCES, ARRANGED BY TITLE, WITH  
PUBLICATION DATES BETWEEN JANUARY 1958 AND AUGUST  
1961. FOLLOWING THE REFERENCES ARE INDEXES OF  
AUTHORS AND SPONSORS, JOURNAL SOURCES, AND REPORT  
NUMBERS. THE FOLLOWING SOURCES WERE CONSULTED  
DURING THE SEARCH: LMSC TECHNICAL INFORMATION  
CENTER CARD CATALOGS, APPLIED SCIENCE AND  
TECHNOLOGY INDEX, 1958-1961, ASTIA TECHNICAL  
ABSTRACT BULLETIN, 1958-1961, ELECTRICAL  
ENGINEERING ABSTRACTS, 1958-1961, ENGINEERING  
INDEX, 1958-1961, U.S. GOVERNMENT RESEARCH  
REPORTS, 1960-1961, AND PERTINENT JOURNALS, 1961.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-265 894

NATIONAL CASH REGISTER CO DAYTON OHIO

A STUDY OF THE ENCAPSULATION APPLICABLE TO LIQUID  
ROCKET FUEL

(U)

JUN 61 1V HSIEN, PAUL Y.;  
CONTRACT: NONR284800

UNCLASSIFIED REPORT

DESCRIPTORS: \*AMIDES, \*DROPS, \*ENCAPSULATION, \*FILMS,  
\*HYDRAZINES, \*LIQUID ROCKET PROPELLANTS, \*METHYL  
HYDRAZINES, COATINGS, COPOLYMERIZATION, ETHYLENES, GELS,  
LIQUIDS, MEMBRANES, ORGANIC COMPOUNDS, PHYSICAL  
PROPERTIES, POLYMERIZATION, POLYMERS, PRODUCTION, ROCKET  
FUELS, ROCKET OXIDIZERS

(U)

THE PHENOMENA INVOLVED IN ENCAPSULATION FROM  
NONAQUEOUS MEDIA IS DISCUSSED. STUDIES INCLUDED:  
(1) ESTABLISHMENT OF THE ESSENTIAL CONDITIONS FOR  
THE ACCUMULATION OF MACROMOLECULES AROUND A  
DISPERSED LIQUID DROPLET TO BE ENCAPSULATED  
(INTERNAL PHASE); (2) ENCAPSULATION OF  
LIQUIDS BY INTERFACIAL POLYMERIZATION APPROACH; AND  
(3) TESTING OF THE COMPATIBILITY OF ETHYLENE  
DIAMINE, 1,1-DIMETHYL HYDRAZINE, AND HYDRAZINE WITH  
VARIOUS SOLVENTS. AMINES, ESPECIALLY ETHYLENE  
DIAMINE, WERE SELECTED AS MODEL COMPOUNDS.  
(AUTHOR)

(U)

UNCLASSIFIED

DDG REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-265 895

NATIONAL CASH REGISTER CO DAYTON OHIO

A STUDY OF THE ENCAPSULATION APPLICABLE TO LIQUID  
ROCKET FUE

(U)

JAN 61 IV HSIEN, PAUL Y.  
CONTRACT: NONR204800

UNCLASSIFIED REPORT

DESCRIPTORS: \*ENCAPSULATION, \*ETHYL CELLULOSE, \*FILMS,  
\*GASES, \*NITROCELLULOSE, \*POLYMERS, \*SEMI PERMEABILITY,  
\*VAPORS, AMMONIA, ARGON, CARBON DIOXIDE, COATINGS,  
DIFFUSION, DIPOLE ANTENNAS, HELIUM, LIQUID ROCKET  
PROPELLANTS, MEMBRANES, NITROGEN, OXYGEN, PLASTIC  
COATINGS, ROCKET FUELS, SOLUBILITY, SULFUR COMPOUNDS,  
WATER VAPOR

(U)

PERMEABILITY OF ETHYLCELLULOSE AND NITROCELLULOSE  
FILMS TO 13 DIFFERENT GASES AND VAPORS WAS  
DETERMINED. THE SOLUBILITY OF THESE GASES AND  
VAPORS IN ETHYLCELLULOSE AND NITROCELLULOSE WAS ALSO  
MEASURED BY GRAVIMETRIC AND VOLUMETRIC METHODS OF  
EQUILIBRIUM SORPTION. FROM THESE DATA FOR  
PERMEABILITY AND SOLUBILITY, DIFFUSION CONSTANTS OF  
THE GASES AND VAPORS IN THE POLYMERIC FILMS WERE  
CALCULATED BY MEANS OF THE RELATION,  $P$  EQUALS  $DS$ .  
IT WAS FOUND THAT THE DIFFUSION CONSTANT DECREASED  
LINEARLY WITH AN INCREASE OF MOLECULAR WEIGHT;  
HOWEVER, THE SHAPE FACTOR OF THE MOLECULES PLAYED AN  
IMPORTANT ROLE IN DIFFUSION. THE SOLUBILITY  
CONSTANTS DECREASED LINEARLY WITH AN INCREASE OF THE  
LENNARD-JONES FORCE CONSTANTS WHEN SOLUBILITY WAS  
EXPRESSED ON % WP. INCL. IL WEIGHT BASIS RATHER  
THAN A VOLUME BASIS. IT IS POSSIBLE TO ESTIMATE  
PERMEABILITIES OF OTHER GASES AND VAPORS IN THESE  
FILMS FROM THEIR MOLECULAR WEIGHTS AND LENNARD-  
JONES FORCE CONSTANTS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-266 861

SYNTHETIC MICA CO WEST CALDWELL N J

DEVELOPMENT OF ULTRA HIGH TEMPERATURE DIELECTRIC  
MATERIALS FOR EMBEDDING AND ENCAPSULATING ELECTRONIC  
COMPONENTS (U)

FEB 61 IV BARR, F. A. MCCARTHY, J. P.  
CONTRACT: NOBS7(714

UNCLASSIFIED REPORT

DESCRIPTORS: • EMBEDDING SUBSTANCES, • ENCAPSULATION,  
• MICA, ALUMINUM COMPOUNDS, BINDERS, BORATES, CASTING,  
DIELECTRIC PROPERTIES, DIELECTRICS, ELECTRICAL  
PROPERTIES, ELECTRONIC EQUIPMENT, GLASS, LEAD COMPOUNDS,  
MOLDING MATERIALS, PHOSPHATES, PHYSICAL PROPERTIES,  
POROSITY, PRESSURE, PROCESSING, SILICONES, SYNTHETIC  
RUBBER (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-274 642

DEPUTY COMMANDER AEROSPACE SYSTEMS INGLEWOOD CALIF

CRYSTAL GROWTH AND CRYSTALLOGRAPHY. A LITERATURE  
SURVEY

(U)

JAN 62 IV CHERON, THEODORE;  
REPT. NO. TDR62 5  
CONTRACT: AF04 647 930  
MONITOR: DCAS TDR62 5

UNCLASSIFIED REPORT

DESCRIPTORS: •BIBLIOGRAPHIES, •CORUNDUM, •CRYSTALS,  
•GARNET, •RUBY, •SPINELS, ALUMINUM COMPOUNDS, CRYSTAL  
STRUCTURE, FERRITES, GROWTH, LASERS, METALLIC COMPOUNDS,  
OXIDES, PREPARATION, REFRACTORY MATERIALS, SAPPHIRES,  
SPECTROGRAPHIC ANALYSIS

(U)

THIS BIBLIOGRAPHY, CONSISTING OF 162 ENTRIES,  
COVERS THE PERIOD FROM 1950 TO 1961. IT REVIEWS  
THE LITERATURE ON THE PREPARATION OF CRYSTALS FOR  
LASERS, COVERING MAGNETIC AND NON-MAGNETIC GARNETS,  
RUBIES, CRYSTALLOGRAPHY, AND HIGH-MELTING METAL  
OXIDES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-283 325

STANFORD RESEARCH INST MENLO PARK CALIF

ENCAPSULATED AEROSOLS

(U)

APR 62

IV

ROBBINS, ROBERT C.;

UNCLASSIFIED REPORT

DESCRIPTORS: •AEROSOLS, •COATINGS, •ENCAPSULATION, AMMONIUM COMPOUNDS, BENZOIC ACIDS, CHEMICAL WARFARE AGENTS, CHLORIDES, COAGULATION, CONDENSATION, DIOXIDES, ELECTROSTATICS, ETHYLENES, FILMS, LIQUIDS, NITROGEN COMPOUNDS, PHOSPHATES, PHOSPHITES, PHOSPHORIC ACIDS, PHTHALATES, POLYMERIZATION, POLYMERS, SOLIDS, VAPORS (U)

METHODS OF AEROSOL ENCAPSULATION INCLUDED: PREENCAPSULATION, COLLECTION, THEN REDISPERSION; ENCAPSULATION BY CONDENSATION FROM A SUPERSATURATED VAPOR, OR BY CONDENSATION INVOLVING CATALYTIC POLYMERIZATION; AND VARIOUS COAGULATION METHODS. THE PHYSICAL AND CHEMICAL PROPERTIES OF THE CORE AND COAT MATERIALS DETERMINE THE RANGE OF APPLICABILITY OF EACH METHOD. A USEFUL MICROENCAPSULATION METHOD, BASED ON COAGULATION BY INERTIAL FORCE WAS DEVELOPED. THE GENERATION APPARATUS, CONSISTING OF TWO AEROSOL GENERATORS IN SERIES, WAS UTILIZED TO PRODUCE MANY KINDS OF MICROCAPSULES. A FLUID ENERGY MILL WAS FOUND USEFUL FOR THE PRODUCTION OF SOME MICROCAPSULES. THE PERMEABILITY OF MICROCAPSULE FILMS AND THE EFFECT OF EXPOSURE TIME AND HUMIDITY WERE STUDIED USING DIBUTYL PHOSPHITE CORES. PHYSICAL PROPERTIES OF MICROCAPSULE CORE AND COAT MATERIALS BELIEVED TO BE IMPORTANT IN ENCAPSULATION WERE MEASURED. (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-284 D, 5

SOUTHWEST RESEARCH INST SAN ANTONIO TEX

ENCAPSULATION OF FOODS

(U)

IV SCHUETZE, CLARKE E.; MCHAHON, WILLIAM

E.;

REPT. NO. TDR62 53

CONTRACT: AF33 616 7717

MONITOR: 6570 AMRL TDR62 53

UNCLASSIFIED REPORT

DESCRIPTORS: •CONTAINERS, •ENCAPSULATION, •FOOD,  
COATINGS, PRESERVATION, PROCESSING, SPACE FLIGHT (U)

BARRIER MATERIALS MEETING FOOD AND DRUG ADMINISTRATION STANDARDS WERE STUDIED FOR USE IN THE ENCAPSULATION OF FOODS, AND FOR THE PREPARATION OF SAMPLE CAPSULES OF FOOD ITEMS FOR EVALUATION. THE ENCAPSULATING MATERIAL MUST BE CAULE CONTENTS UNDER AMBIENT CONDITIONS AND ALSO IN HIGH TEMPERATURE AND HIGH VACUUM ENVIRONMENTS. THE FOOD IN THE CAPSULES MUST REMAIN UNCONTAMINATED AND HIGHLY STABLE FOR SIX MONTHS WITHOUT REFRIGERATION. FOOD OF LOW MOISTURE CONTENT WERE ENCAPSULATED IN TWO STEPS, USING A SOFT-SHELLED CAPSULE WITH AN OVERWRAP. FUDGE, POUND CAKE, AND BROWNIES WERE FIRST PLACED IN PREFORMED CONTAINERS; CARAMELS AND PECANS WERE FIRST SPRAY COATED OF MAINTAINING ITS ESSENTIAL PROPERTIES AND THOSE OF THE CAPSULE CONTENTS UNDER AMBIENT CONDITIONS AND ALSO IN HIGH TEMPERATURE AND HIGH VACUUM ENVIRONMENTS. THE FOOD IN THE CAPSULES MUST REMAIN UNCONTAMINATED AND HIGHLY STABLE FOR SIX MONTHS WITHOUT REFRIGERATION. FOODS OF LOW MOISTURE CONTENT WERE ENCAPSULATED IN TWO STEPS, USING A SOFT-SHELLED CAPSULE WITH AN OVERWRAP. FUDGE, POUND CAKE, AND BROWNIES WERE FIRST PLACED IN PREFORMED CONTAINERS; CARAMELS AND PECANS WERE FIRST SPRAY COATED. IN EACH CASE THE BITE-SIZED PORTIONS WERE HEAT-SEALED INTO PLASTIC BAGS. FOODS OF MODERATE MOISTURE CONTENT, EXEMPLIFIED BY MEAT, AND FOODS OF HIGH MOISTURE CONTENT, SUCH AS VEGETABLES AND FRUITS, WERE ENCAPSULATED IN LAMINATED CONTAINERS WITH AN OVERWRAP. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-286 907

PHILCO CORP LANSDALE PA

PEM FOR TRANSISTOR MANUFACTURING PROCESS  
IMPROVEMENT

(U)

JUL 62 1V SANDERS, J. J.  
REPT. NO. R 232 1  
CONTRACT: DA36 039SC86720

UNCLASSIFIED REPORT

DESCRIPTORS: (•TRANSISTORS), (•MANUFACTURING  
METHODS), RELIABILITY, STRESSES, STORAGE,  
OPERATION, ENCAPSULATION, ELECTRODES,  
TEMPERATURE, SEALS(STOPPERS), DEGASIFICATION,  
CHEMICAL MILLING, HIGH-TEMPERATURE RESEARCH,  
PRODUCTION

(M)

A PRODUCTION ENGINEERING MEASURE WAS STUDIED FOR  
IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE  
RELIABILITY FOR THE JET ETCH TRANSISTOR TYPE  
2N501A, WITH A MAXIMUM OPERATING FAILURE RATE OF  
0.01% PER 1000 HOURS AT A 90% CONFIDENCE LEVEL AT  
25 C AS AN OBJECTIVE. EFFORTS WERE MADE TO  
IMPROVE THE FOLLOWING SEVEN MANUFACTURING PROCESSES:  
(1) PLATING EDGE DEFINITION, (2) HIGHER  
TEMPERATURE ALLOYS, (3) LEAD ATTACHMENTS  
(INCLUDES COLLECTOR ATTACHMENTS), (4)  
CONTROLLED FORMATION OF SURFACE OXIDES FOR SURFACE  
STABILIZATION, (5) GETTERING TECHNIQUES FOR  
ENCAPSULATING AND SEALING, (6) THERMAL  
DISSIPATION OF PACKAGE, AND (7) LEAK  
DETERMINATION. ESTABLISHMENT OF A PILOT LINE TO  
INCORPORATE THESE PROCESS IMPROVEMENTS IS REPORTED.  
PRELIMINARY OPERATING STRESS DATA ON TRANSISTORS  
FABRICATED ON THE PILOT LINE INDICATES AN  
IMPROVEMENT IN POWER HANDLING CAPABILITY AS A RESULT  
OF THE PROCESS IMPROVEMENTS COMPLETED. PROBLEMS  
ASSOCIATED WITH OPERATING STRESS TESTING AND WITH  
OBTAINING CORRELATION BETWEEN OPERATING STRESS  
TESTING AND STORAGE STRESS TESTING ARE DISCUSSED.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /ZZZHT

AD-289 291

WESTINGHOUSE ELECTRIC CORP WASHINGTON D C

HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED  
RECTIFIERS

(U)

OCT 62        1V

CONTRACT: NCBSR87646

UNCLASSIFIED REPORT

DESCRIPTORS: \*POWER, \*RECTIFIERS, ALUMINUM, ANTIMONY,  
BORON, COOLING, CRYSTALLIZATION, CRYSTALS, DIFFUSION,  
ELECTRIC CURRENTS, ELECTRIC POTENTIAL, ENCAPSULATION,  
GOLD ALLOYS, MOLYBDENUM, SILICON, SWITCHING CIRCUITS,  
TRANSIENTS

(U)

DEVELOPMENT OF A HIGH CURRENT, HIGH VOLTAGE SILICON  
CONTROLLED RECTIFIER.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-294 110

TOW SEMICONDUCTORS INC LAWDALE CALIF

PRODUCTION ENGINEERING MEASURE RELIABILITY THRU  
PROCESS IMPROVEMENT

(U)

SEP 62 IV BARNES, S.H.; CHIEN, F.;

UNCLASSIFIED REPORT

DESCRIPTORS: \*MANUFACTURING METHODS, \*TRANSISTORS,  
DIFFUSION, ELECTRICAL PROPERTIES, ENCAPSULATION,  
EVAPORATION, FAILURE (MECHANICS), LIFE EXPECTANCY,  
PROCESSING, PRODUCTION, QUALITY CONTROL, RELIABILITY (U)

EFFORT IS PRESENTED ON THE PRODUCTION ENGINEERING  
MEASURE TO INCREASE TRANSISTOR RELIABILITY.  
PROCESS IMPROVEMENTS WITHIN THE MAJOR TASKS OF  
MATERIAL EVALUATION, DIFFUSION AND PHOTORESIST,  
CONTACT METALLIZING, LEAD ATTACHMENT, AND  
ENCAPSULATION WERE ACCOMPLISHED. EMPHASIS WAS  
PLACED ON THE METHOD OF CONTACT METALLIZING AND LEAD  
ATTACHMENT. SAMPLE QUANTITIES OF DEVICES UTILIZING  
AN EVAPORATED ALUMINUM LAYER FOR BASE AND EMITTER  
CONTACTS WERE PLACED ON LIFE TEST. EQUIPMENT WAS  
RECEIVED TO BEGIN ALUMINUM WIRE BONDING.  
FEASIBILITY TESTS TO DETERMINE STRESS LEVELS OF THE  
STEP-STRESS AGING WERE STARTED. RELIABILITY  
EVALUATION OF PRODUCTION DEVICES CONTINUED TO FURTHER  
SUBSTANTIATE THE FAILURE RATE BASIS FROM WHICH THE  
EFFECTS OF THE PROCESS IMPROVEMENT TASKS WILL BE  
MEASURED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-295 538

MCDONNELL AIRCRAFT CORP ST LOUIS MO

ELECTRICAL POTTING COMPOUNDS - SURFACE AND VOLUME  
RESISTIVITY AT ELEVATED TEMPERATURES FOR PROTRACTED  
TIMES (PHASE 11: ELECTRICAL TESTS) (U)

JAN. 63 80P

REPT. NO. 9354

CONTRACT: AF33 657 7749

UNCLASSIFIED REPORT

DESCRIPTORS: •ELECTRONIC EQUIPMENT, •EMBEDDING  
SUBSTANCES, •ENCAPSULATION, CONTAINERS, ELECTRIC  
CONNECTORS, ELECTRICAL PROPERTIES, PACKAGED CIRCUITS,  
PLASTICS, RESISTANCE (ELECTRICAL), TEMPERATURE, TESTS (U)

POTTING COMPOUNDS FOR ELECTRONIC CIRCUITS; SURFACE  
AND VOLUME RESISTIVITY AT ELEVATED TEMPERATURE  
FOR PROTRACTED PERIODS OF TIME.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-296 356

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

INSPECTING AND TESTING OF EMBEDDING MATERIALS AND  
COMPONENTS OF ELECTRICAL MODULES BEFORE, DURING AND  
AFTER ASSEMBLY: A PARTIALLY ANNOTATED  
BIBLIOGRAPHY (U)

NOV. 62 1V PIERCE, CHARLIE M.;  
REPT. NO. SB62 433 80 62 28

UNCLASSIFIED REPORT

DESCRIPTORS: \*EMBEDDING SUBSTANCES, \*ENCAPSULATION,  
AGING (MATERIALS), BIBLIOGRAPHIES, CONTAMINATION,  
DEGRADATION, EFFECTIVENESS, ELECTRON MICROSCOPY,  
ELECTRONIC EQUIPMENT, EPOXY PLASTICS, ISOCYANATE  
PLASTICS, MEASURING DEVICES (ELECTRICAL + ELECTRONIC),  
MICROORGANISMS, MINE STERILIZERS, NON-DESTRUCTIVE  
TESTING, PLASTICS, POLAROGRAPHIC ANALYSIS, PRINTED  
CIRCUITS, RADIOGRAPHY, RESISTANCE (ELECTRICAL), SEALING  
COMPOUNDS, SPACECRAFT, STRAIN GAGES, STRESSES, TEST  
METHODS (U)

AD-296 3569N4 +++BIBLIOGRAPHY ON INSPECTION  
AND TESTING OF EMBEDDING MATERIALS AND COMPONENTS OF  
ELECTRONICS MODULES BEFORE, DURING, AND AFTER  
ASSEMBLY. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-412 282

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

VACUUM DE-GASSING OF ENCAPSULANTS,

(U)

JUN 61 17P DEFELICE, A. I  
REPT. NO. MRI267 01

UNCLASSIFIED REPORT

DESCRIPTORS: (•ENCAPSULATION, MANUFACTURING  
METHODS), (•MODULES (ELECTRONIC), DEGASIFI  
CATION), VACUUM APPARATUS, EPOXY PLASTICS,  
POLYETHYLENE PLASTICS, TEMPERATURE, TESTS,  
BUBBLES, CRAZING, HARDNESS, CASTING.  
IDENTIFIERS: 1961, VACUUM IMPREGNATOR.

(U)

(U)

PROCESSES AND TECHNIQUES FOR THE OPERATION OF THE  
VACUUM IMPREGNATOR FOR DE-GASSING THE RESINS USED  
FOR ENCAPSULATING ELECTRONIC MODULES IS REPORTED. A  
TOTAL OF 225 DISTINCT TESTS WERE RUN USING 9  
DIFFERENT RESIN FORMULATIONS. RESIN TYPES IN  
CLUDED EPOXIES AND POLYURETHANES. TWO FACTORS,  
PRE-MIX TEMPERATURE OF INGREDIENTS AND APPLI CATION  
OF VACUUM WERE VARIED. THE RESULTING SAMPLES WERE  
EVALUATED FOR BUBBLES, CRACKS, CRAZING AND HARDNESS.  
APPLICATION OF VACUUM TO BATCHES PRIOR TO CASTING  
AND CURING PROVED EFFECTIVE FOR DE-GASSING  
ENCAPSULATING MATERIALS FOR MOST OF THE FORMULATIONS  
TESTED. TAKEN OVER ALL THE RESULTS VARIED WIDELY,  
RANGING FROM PERFECT TO UNACCEPTABLE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-427 412

PICATINNY ARSENAL DOVER N J AMMUNITION ENGINEERING  
DIRECTORATE

ENCAPSULATING PROPELLANTS BY MEANS OF ULTRASONIC  
WELDING, (U)

DEC 63 16P ZGLENICKI, CHARLES ; SILBERMAN,  
LOUIS ;  
REPT. NO. AED-TM-1208

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ULTRASONIC RADIATION, WELDING),  
(•PROPELLANT TANKS, WELDING), (•WELDING, PROPELLANT  
TANKS), ENCAPSULATION, ALUMINUM, TESTS, INDUSTRIAL  
EQUIPMENT, STORAGE (U)  
IDENTIFIERS: ULTRASONIC WELDING, 1963 (U)

AN AL CONTAINER HOLDING M5 PROPELLANT HAS  
CAUSED FUNCTIONAL PROBLEMS BECAUSE OF INADEQUATE  
SEALING. THE ULTRASONIC WELDING APPROACH PROVIDED  
THE MOST EFFECTIVE AND DURABLE SEAL. ONE HUNDRED  
AND THIRTY-THREE CONTAINERS SEALED BY ULTRASONIC  
WELDING WITHSTOOD 28 DAYS TEMPERATURE CYCLING WITHOUT  
ANY DETECTABLE LEAKAGE. THIRTY-FIVE CONTAINERS  
FILLED WITH M5 PROPELLANT WERE TEMPERATURE-CYCLED  
AND EXPOSED TO A SOLVENT-SATURATED ATMOSPHERE FOR 11  
DAYS. CLOSED BOMB TESTS OF THE PROPELLANT  
AFTERWARD INDICATED AN EFFECTIVE SEAL WAS ACHIEVED.  
METICULOUS ATTENTION TO SURFACE CLEANLINESS IS NOT  
REQUISITE TO ACHIEVE SOUND WELDS. FOIL THIN COVERS  
WHICH PRESENT A MINIMUM RESISTANCE TO PROPAGATION OF  
EXPLOSIVE EFFECTS CAN BE WELDED. PROPELLANT  
TRAPPED IN THE WELD ZONE DID NOT IGNITE.  
SIGNIFICANT COST SAVINGS CAN BE REALIZED IN HIGH  
VOLUME PRODUCTION OVER METHODS USING SPECIAL  
SEALANTS. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-430 751

NAVAL RESEARCH LAB WASHINGTON D C

ENCAPSULATION TECHNIQUES FOR NRL IRRADIATION EFFECTS  
STUDIES. (U)

DESCRIPTIVE NOTE: PROGRESS REPT.,  
DEC 63 23P STEELE, L. E. ; HAWTHORNE, J. R.

REPT. NO. NRL-MR-1481

PROJ: SR007 01 01

TASK: 0858

UNCLASSIFIED REPORT

DESCRIPTORS: (\*STEEL, RADIATION DAMAGE); (\*CONTAINERS;  
DESIGN); ENCAPSULATION, NUCLEAR REACTORS, REACTOR  
MATERIALS, TEST REACTORS, MECHANICAL PROPERTIES,  
THERMAL RADIATION, POWER REACTORS, STAINLESS STEEL,  
ALUMINUM, TEST FACILITIES (U)  
IDENTIFIERS: 1963, NUCLEAR RADIATION (U)

VARIOUS SYSTEMS AND TECHNIQUES FOR ENCAPSULATION OF  
IRRADIATION EXPERIMENTS HAVE BEEN DEVISED IN THE  
COURSE OF SEVERAL YEARS OF RESEARCH USING SEVERAL  
AEC TEST REACTOR FACILITIES. A CAPSULE DESIGN  
PHILOSOPHY HAS EVOLVED WHICH IS BASED UPON THE USE  
OF TWO TYPES OF CAPSULES, SEALED UNITS AND EXTERNALLY  
CONTROLLED UNITS FOR THE IRRADIATION OF LARGE NUMBERS  
OF METALLURGICAL SPECIMENS UNDER A RANGE OF THERMAL  
AND NUCLEAR CONDITIONS. THE BASIC PHILOSOPHY OF  
CAPSULE DESIGN IS DESCRIBED ALONG WITH SPECIFIC  
TECHNIQUES UTILIZED FOR VARIOUS TEST REACTOR CAPSULES  
AND FOR LONG-TERM POWER REACTOR SURVEILLANCE  
CAPSULES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-432 229

NAVAL BOILER AND TURBINE LAB PHILADELPHIA PA

EVALUATION OF HIGH TEMPERATURE INSTRUMENTATION FOR  
DYNAMIC ANALYSIS. ENCAPSULATED STRAIN GAGE  
INSTALLATION FOR USE IN STEAM ENVIRONMENT, (U)

FEB 64 49P TOLOTTA, S. ;

PROJ: A384

TASK: SFO13 06 20 ,SUBTASK 3950

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•STRAIN GAGES, STEAM), (•BOILERS,  
INSTRUMENTATION), SEALS (STOPPERS), INSTALLATION),  
WELDS, ENCAPSULATION, FRACTURE (MECHANICS) THERMAL  
STRESSES, HIGH TEMPERATURE RESEARCH (U)  
IDENTIFIERS: 1964 (U)

AN INSPECTION OF THE INTERIOR OF A STEAM DRUM  
ABOARD THE USS DECATUR REVEALED A CRACK EXTENDING  
AROUND THE UPPER HALF OF THE MANWAY. THE STRESSES  
CAUSING THE FAILURE WERE THOUGHT TO BE HIGHLY  
CONCENTRATED; THEREFORE, IT WAS NECESSARY TO USE A  
STRAIN GAGE WITH A SHORT GAGE LENGTH (1/8 IN)  
THAT COULD OPERATE IN A SATURATED STEAM ATMOSPHERE AT  
1200 PSIG. BECAUSE THERE WERE NO KNOWN CEMENTS OR  
PROTECTIVE COATINGS WHICH WERE CAPABLE OF OPERATION  
IN THE PROPOSED ENVIRONMENT, IT WAS NECESSARY TO  
DEVELOP A SPECIAL GAGE INSTALLATION. THE UNIT  
DEVELOPED CONSISTED OF A STRAIN GAGE CEMENTED ATOP A  
STAINLESS STEEL SHIM WHICH HAD BEEN TACK WELDED TO  
THE TEST SPECIMEN AND THEN SEALED BY SILVER  
SOLDERING. THIS TYPE INSTALLATION WAS CAPABLE OF  
MEETING THE REQUIREMENTS. DETAILED INSTRUCTIONS  
FOR CONSTRUCTION, INSTALLATION AND CALIBRATION ARE  
DESCRIBED IN APPENDIXED INSTRUMENT STANDARDS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-433 654

PHILCO CORP LANSDALE PA

PEM FOR TRANSISTOR MANUFACTURING PROCESS  
IMPROVEMENT.

(U)

DESCRIPTIVE NOTE: FINAL PROGRESS REPT., 30 APR 62-31  
DEC 63,

DEC 63 210P SANDERS, J. G. ;

CONTRACT: DA36 039SC06720

PROJ: R232

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (TRANSISTORS, MANUFACTURING METHODS);  
(SPECIFICATIONS, PROCESSING), GERMANIUM, ELECTRODES,  
NICKEL, TIN ALLOYS, ZINC ALLOYS, GALLIUM ALLOYS, HEAT  
RESISTANT METALS AND ALLOYS, DEGASIFICATION,  
ENCAPSULATION, EMISSIVITY, COATINGS, MASS SPECTROSCOPY,  
TEST METHODS, LIFE EXPECTANCY, QUALITY CONTROL (U)  
IDENTIFIERS: JET ETCH TYPE TRANSISTOR, 1963, THERMAL  
RESISTANCE (U)

THE WORK FOR RELIABILITY IMPROVEMENT OF THE JET  
ETCH TYPE TRANSISTOR THROUGH PROCESS IMPROVEMENTS IS  
COMPLETE. THE REPORT INCLUDES THE OVER-ALL  
PROCESSING SPECIFICATION FOR THE IMPROVED TRANSISTOR,  
AND THE APPLICABLE INSPECTION AND QUALITY  
CONTROL PLAN. DATA ARE GIVEN ON THE FINAL TEST  
LOT OF THE IMPROVED DEVICE AND INDICATE THE LOT  
ACCEPTANCE TEST WAS PASSED. THE METHOD DEvised  
FOR ACCELERATED TESTING AND EXTRAPOLATION OF  
RELIABILITY LEVELS UNDER USE CONDITIONS WAS  
EFFECTIVELY DEMONSTRATED. ACCUMULATED DATA ON  
TRANSISTORS PRODUCED USING THE IMPROVED PROCESSES  
SHOW THAT AN ACCELERATION CURVE HAVING A SLOPE  
EQUIVALENT TO AN ACTIVATION ENERGY OF 19.6 KCAL/  
MOLE IS REALISTIC FOR THE IMPROVED DEVICE. THERMAL  
RESISTANCE MEASUREMENT STUDIES SHOWED THAT THE D-C  
BETA METHOD OF TEST WITH VOLTAGE COMPENSATION GIVES  
RESULTS THAT ARE REPRODUCIBLE AND CLOSELY APPROACH  
THE VALUES OF EFFECTIVE THERMAL RESISTANCE DETERMINED  
FROM OPERATING AND STORAGE LIFE TESTS. THE MAXIMUM  
OPERATING RATING OF THE IMPROVED TRANSISTOR IS  
REPORTED AS 150 MW AT 25 C AT A  $\lambda_{max} = 0.78$ .  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-435 114

RADIO CORP OF AMERICA SOMERVILLE N J

PRODUCTION ENGINEERING MEASURE ON 2N1708 SILICON  
PLANAR EPITAXIAL TRANSISTOR. VOLUME 1.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 1 MAY 62-30 NOV 63,  
NOV 63 160P GRANGER, G. F. ; POSSEMATO, L.

R. ;

CONTRACT: DA36 039SC86729

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TRANSISTORS, EPITAXIAL GROWTH),  
RELIABILITY, SILICON, ELECTRONIC SWITCHES, ELECTRICAL  
PROPERTIES, PROCESSING, MANUFACTURING METHODS, CRYSTAL  
SUBSTRUCTURES, PHOTOENGRAVING, SEMICONDUCTOR DEVICES,  
DIFFUSION, METALLURGY, GOLD ALLOYS, WIRE, GOLD,  
ALUMINUM, PELLETS, ENVIRONMENTAL TESTS, FIXED CONTACTS,  
METAL SEALS, NICKEL, ENCAPSULATED, STORAGE, TESTS,  
STRESSES, ACCELERATION, FAILURE (MECHANICS),  
DISSIPATION, OPERATION, LIFE EXPECTANCY, AGING  
(MATERIALS), SWITCHING CIRCUITS

(U)

IDENTIFIERS: 1963

(U)

A PRODUCTION RUN WAS MADE TO DEMONSTRATE THE  
RELIABILITY ACHIEVED AS A RESULT OF PROCESS  
IMPROVEMENTS INCORPORATED INTO THE PROCESSING. A  
SUMMARY OF THE WORK PERFORMED IN EACH OF THE MAJOR  
PROCESSING AREAS TO EFFECT THE IMPROVEMENT IS  
DESCRIBED IN THIS REPORT. A PROGRAM OF LIFE  
TESTING, ANALYSIS OF EXISTING LIFE TEST DATA AND  
FAILURE ANALYSIS WAS PERFORMED CONCURRENTLY WITH THE  
WORK IN THE PROCESSING AREA. THIS PROGRAM INCLUDED  
ACCELERATED TESTING ON BOTH STORAGE AND OPERATING  
LIFE TESTS WHICH LEAD TO THE ESTABLISHMENT OF  
ACCELERATION CURVES, THE ANALYSIS OF RESULTS ON  
EXTENDED LIFE TESTS, THE ANALYSIS OF FAILURES, AND A  
STUDY OF THE EFFECT OF AGING. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /ZZZHT

AD-443 097

SYLVANIA ELECTRONIC SYSTEMS-WEST MOUNTAIN VIEW CALIF  
ELECTRONIC DEFENSE LABS

NONCOMMUNICATIONS EXPENDABLE JAMMER INVESTIGATIONS.  
VOLUME 3. MECHANICAL DEVELOPMENT, (U)

APR 64 55P FIRTH, MILTON ; REICHOLD,  
RALPH ;  
REPT. NO. EDL G220 , VOL. 3  
CONTRACT: DA36 039AMC00088E

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•RADIO JAMMING, LANDING IMPACT), (•LANDING  
IMPACT, PACKAGING), RADAR JAMMING, AIR DROP OPERATIONS,  
SEMICONDUCTOR DEVICES, MODULES (ELECTRONIC), SHOCK  
(MECHANICS), ENCAPSULATION, DROP TESTING, MATHEMATICAL  
ANALYSIS, SUBMINIATURE ELECTRONIC EQUIPMENT,  
MICROMINIATURIZATION (ELECTRONICS), SHOCK RESISTANCE,  
MOUNTING BRACKETS (U)  
IDENTIFIERS: EXPENDABLE JAMMER (U)

RESULTS ARE REPORTED OF A STUDY TO DETERMINE  
OPTIMUM PACKAGING TECHNIQUES FOR THE ELECTRONIC  
EQUIPMENT AND THE SHOCK LEVELS THAT THE DIFFERENT  
PACKAGES AND CERTAIN ELECTRONIC COMPONENTS COULD  
WITHSTAND, AS WELL AS LANDING TECHNIQUES AND SHOCK  
ATTENUATION DEVICES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-489 906 9/1  
SPEER CARBON CO NIAGARA FALLS N Y

RESISTORS FOR MICROPOWER CIRCUITS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4, 1 APR-30 JUN 66,

OCT. 66 13P PARKS, CHARLES F. ;  
REPT. NO. SCC-24, R-140  
CONTRACT: DA-28-043-AMC-01524(E)  
PROJ: DA-1P6-22001-A-057  
TASK: 1P6-22001-A-057-06  
MONITOR: ECOM 01524-4

UNCLASSIFIED REPORT

DESCRIPTORS: (•RESISTORS, DESIGN), SURFACE  
PROPERTIES, OPTIMIZATION, ENCAPSULATION, ELECTRIC  
CONNECTORS, ELECTRIC WIRE, PROCESSING,  
PREPARATION, SUBSTRATES, ELECTRICAL PROPERTIES,  
TEMPERATURE, RESISTANCE(ELECTRICAL),  
NOISE(RADIO), FILMS

(U)

IDENTIFIERS: MICROPOWER RESISTORS

(U)

MICROPOWER RESISTORS OF 4.7 MEGOHM RESISTANCE VALUE  
HAVE BEEN PREPARED IN FINISHED FORM FOR TESTING  
ACCORDING TO SPECIFICATIONS. PRELIMINARY  
INVESTIGATIONS INCIDENT TO THEIR PREPARATION HAVE  
BEEN COMPLETED. THE STRENGTH OF SUBSTRATES HAS  
BEEN STUDIED, AND PROCESSING PARAMETERS IN THE  
PRESSING OPERATION HAVE BEEN EVALUATED.  
FABRICATION OF SUBSTRATES UNDER CONDITIONS  
INDICATED IN THIS INVESTIGATION HAS BEEN  
ACCOMPLISHED, AND SUBSTRATES OF SATISFACTORY STRENGTH  
HAVE BEEN PRODUCED. A NUMBER OF OTHER RESISTOR  
PROCESSING VARIABLES HAVE ALSO BEEN EXAMINED. THE  
SURFACE PREPARATION OF SUBSTRATES AND THE USE OF  
VARIOUS TERMINATING MATERIALS HAVE BEEN INVESTIGATED  
FOR EFFECTS ON RESISTANCE AND NOISE. IMPROVEMENT  
IN PROPERTIES OF RESISTORS HAS BEEN OBTAINED.  
DIFFERENT RESISTIVE PASTES HAVE BEEN COMPARED TO  
PERMIT SELECTION OF ONE PRODUCING AN OPTIMUM  
COMBINATION OF FIRED PROPERTIES. FIRED RESISTIVE  
FILMS ON THE NEW SUBSTRATE SYSTEM HAVE BEEN HELIXED  
SUCCESSFULLY USING THE IMPROVED HELIXING MACHINE, AND  
A NEWLY INSTALLED BRIDGE CIRCUIT HAS PERMITTED  
REPRODUCIBLE HELIXING TO VALUE. ENCAPSULATION OF  
HELIXED UNITS HAS BEEN INVESTIGATED AND EFFECTS ON  
RESISTANCE VALUE AND TEMPERATURE COEFFICIENT OF  
RESISTANCE HAVE BEEN FOUND TO BE ESSENTIALLY  
NEGLECTIBLE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-601 772

NATIONAL CASH REGISTER CO DAYTON OHIO

A STUDY OF THE ENCAPSULATION OF HIGH ENERGY  
SUBSTANCES.

(U)

DESCRIPTIVE NOTE: FINAL REPT.; 1 APR 59-31 DEC 63.  
APR 64 69P PETROPOULOS, CONSTANTINE C. ;  
CONTRACT: NONR2848 00

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•LIQUID ROCKET PROPELLANTS,  
ENCAPSULATION), (•ENCAPSULATION, LIQUID ROCKET  
PROPELLANTS), (•PLASTICS, COMPATIBILITY), FILMS,  
PERMEABILITY, HYDRAZINE, POLYAMIDE PLASTICS, ACRYLIC  
RESINS, POLYMERIZATION COPOLYMERIZATION (U)  
IDENTIFIERS: GLYCIDYL METHACRYLATE, HYDROXYETHYL  
METHACRYLATES, METHALLYL METHACRYLATE, VINYLOXYETHYL  
METHACRYLATES (U)

INITIAL WORK WAS DIRECTED TOWARDS THE UNDERSTANDING  
OF BASIC FACTORS RESPONSIBLE FOR SMALL MOLECULES  
PERMEATING POLYMERIC FILMS. PROGRESS WAS MADE IN  
THIS AREA. IN ADDITION, RESEARCH WAS CONDUCTED IN  
THE AREA OF ENCAPSULATION. THIS RESEARCH INCLUDED  
THE STUDY OF BASIC MECHANISMS ASSOCIATED WITH  
ENCAPSULATION, COMPATIBILITY OF POLYMERS WITH  
POTENTIAL LIQUID FUELS (E. G. HYDRAZINE),  
SYNTHESIS OF NEW POLYMERS, AND THE ENCAPSULATION OF  
LIQUID FUELS OR MODEL COMPOUNDS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-602 270

MOTOROLA INC SCOTTSDALE ARIZ

MINIATURE THIN FILM INDUCTORS (MODIFICATION NO.  
2).

(U)

DESCRIPTIVE NOTE: FINAL DEVELOPMENT REPT. FOR 27 MAY 63-

27 MAY 64,

JUN 64 78P

GLEASON, F. R. ;

REPT. NO. 4003

CONTRACT: NOBSR85397

PROJ: SR00803

TASK: 9636

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (MINIATURE ELECTRONIC EQUIPMENT, (COILS),  
(COILS, METAL FILMS), FILMS, GOLD, ENCAPSULATION,  
FERRITES, NICKEL ALLOYS, ZINC ALLOYS, COBALT ALLOYS,  
INDUCTANCE, SPRAYS, CHLORIDES, VAPOR PLATING,  
EVAPORATION, ELECTRODEPOSITION  
IDENTIFIERS: THIN FILMS

(U)

(M)

THE REPORT DESCRIBES A PROGRAM DIRECTED TOWARD THE DEVELOPMENT OF TECHNIQUES FOR FABRICATING MINIATURE THIN-FILM INDUCTORS. THE BASIC DEVICE CONSISTS OF A FLAT SPIRAL CONDUCTING PATH DEPOSITED ON A BULK FERRITE SUBSTRATE AND ENCAPSULATED WITH A FERRITE FILM DEPOSIT. THE GOAL OF THE PROGRAM WAS TO FABRICATE THESE INDUCTANCES IN A RANGE FROM 38 TO 1000 MICROHENRIES WITH A Q-VALUE OF 100 MEASURED AT 1 MC. THE TECHNIQUE FOR DEPOSITING THE FERRITE FILM BY THE SPRAY HYDROLYSIS OF A CHLORIDE SOLUTION IS DESCRIBED. THE SPIRAL COILS WERE MADE FROM GOLD AND DEPOSITED BY A COMBINATION OF VACUUM EVAPORATION AND ELECTRODEPOSITION TECHNIQUES. THE MAXIMUM AIR CORE COIL INDUCTANCE OBTAINED IN AN AREA 0.3 INCH SQUARE WAS 1.8 MICROHENRIES. THE LARGEST INDUCTANCE VALUE OBTAINED FOR A SINGLE ENCAPSULATED COIL WAS 54 MICROHENRIES WITH A Q-VALUE OF 6 AT 1 MC. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-602 939

TEXAS INSTRUMENTS INC DALLAS

PRODUCTION ENGINEERING MEASURES TO INCREASE  
TRANSISTOR RELIABILITY FOR THE 2N656.

(U)

DESCRIPTIVE NOTE: FINAL PROGRESS REPT. FOR 1 JUL 62-31  
MAR 64.

MAR 64 248P

REPT. NO. 03 64 43

CONTRACT: DA36-039SC86730

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: A PORTION OF THIS DOCUMENT IS  
ILLEGIBLE OR NONREPRODUCIBLE.

DESCRIPTORS: (•TRANSISTORS, RELIABILITY (ELECTRONICS)),  
(•QUALITY CONTROL, TRANSISTORS), ENGINEERING, PRODUCTION  
CONTROL, SILICON, COATINGS, DIFFUSION, BANDING, WELDING,  
ENCAPSULATION, TEST METHODS, GOLD ALLOYS, STRESSES,  
TESTS, MILITARY REQUIREMENT

(U)

IDENTIFIERS: THICK FILMS, PLANAR

(U)

THE PROCESS IMPROVEMENT WORK ON THE 2N656 DEVICE  
WAS COMPLETED DURING THE FIRST TWELVE MONTHS OF THE  
CONTRACT. THE RESULTANT TRANSISTOR IS A RUGGED  
PLANAR DEVICE UTILIZING GOLD ALLOY WAFER MOUNTING,  
ULTRASONIC LEAD BONDING WITH NO INLINE ETCH OR WAFER  
COATING AND IS CAPABLE OF 15 WATTS DISSIPATION AT  
100C CASE TEMPERATURE. IMPROVED FACILITIES,  
PROCESSES AND PROCESS CONTROLS IN THE DIFFUSION,  
PHOTO RESIST, CONTRACT EVAPORATION AND ASSEMBLY AREAS  
HAVE ALL CONTRIBUTED TO THE SIGNIFICANTLY IMPROVED  
PRODUCT QUALITY AND UNIFORMITY. THE MAJOR PORTION  
OF RELIABILITY IMPROVEMENT HAS RESULTED FROM THE  
PLANARIZATION OF THE DEVICE AND THE RE-DESIGN OF THE  
PACKAGE WHICH REPLACED THE SINGLE 0.017 IN. DIAMETER  
WIRE SLUG SUPPORT WITH TWO APPROXIMATELY 0.015 IN.  
THICK BY 0.090 IN. WIDE TABS. STRESS TESTS  
CONDUCTED ON 1,100 PRODUCTION PLANAR DEVICES CONFIRM  
THAT THE IMPROVED TRANSISTOR EXCEEDS THE CONTRACT  
OBJECTIVE OF 0.01% PER THOUSAND OPERATING HOURS AT  
A 90% CONFIDENCE LEVEL. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-604 196

CLEVITE TRANSISTOR PRODUCTS WALTHAM MASS

PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF  
GERMANIUM ALLOY POWER TRANSISTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 7, 31 OCT  
63-31 JAN 64,

JAN 64 24P KELLEY, LUCILLE T.; LOCONTE,  
JEREMIAH A. ;

CONTRACT: DA26 039SC86724

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TRANSISTORS, GERMANIUM); (•MANUFACTURING  
METHODS, TRANSISTORS); DESIGN, QUALITY CONTROL;  
RELIABILITY (ELECTRONICS); FAILURE (MECHANICS);  
STRESSES, LIFE EXPECTANCY, ALLOYS, SOLDERING, CHEMICAL  
MILLING, ENCAPULATION, DESSICANTS, ENVIRONMENTAL TESTS,  
SEMICONDUCTOR DEVICES (U)

ENGINEERING DESIGN CHANGES HAVE BEEN COMPLETED AND  
EVALUATED. THE NEW PROCESS AND PRODUCTION  
TECHNIQUES HAVE BEEN EVALUATED AND IMPLEMENTED INTO  
THE PRODUCTION LINE FLOW. ALL UNITS IN THE FINAL  
PRODUCTION RUN WERE ASSEMBLED ACCORDING TO CONDITIONS  
SPECIFIED IN THE FINAL CONTRACT AGREEMENT. QUALITY  
CONTROL PROCEDURES HAVE BEEN REVIEWED. THE Q.  
C. MANUAL WILL BE INCLUDED IN THE FINAL REPORT.  
FINAL RELIABILITY PROOF TESTING IS IN PROCESS. AN  
IMPROVED FAILURE RATE IS INDICATED, BUT AT THIS DATE  
THE DATA IS INSUFFICIENT TO DRAW FINAL CONCLUSIONS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-605 159

JOHNS HOPKINS UNIV BALTIMORE MD

ANALOG COMPUTER RESEARCH INTO THE ENERGY-EXCHANGE  
BETWEEN GASES AND SOLIDS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT.;

MAY 64 316P ROGERS, MILTON ;

CONTRACT: AF49 638 496

MONITOR: AFOSR , 1001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TRANSPORT PROPERTIES, THERMODYNAMICS),  
(•ENERGY, TRANSPORT PROPERTIES), GASES, SOLIDS,  
PARTICLES, FLUID MECHANICS, TEMPERATURE, SURFACES,  
CHEMISORPTION, ADSORPTION, MATHEMATICAL ANALYSIS, ANALOG  
COMPUTERS (U)

IDENTIFIERS: ENERGY EXCHANGE (U)

A COMPARISON IS MADE BETWEEN VARIOUS MODELS OF THE  
INTERACTION. A DESCRIPTION IS GIVEN OF THE  
CIRCUITRY AND TECHNIQUES USED TO INVESTIGATE THE  
PROBLEM OF ENERGY EXCHANGE BETWEEN GASES AND SOLIDS.  
BOUNDS ON THE APPLICABILITY AND INTERPRETATION OF  
DATA OBTAINED SOLELY FROM COMPUTATIONAL EXPERIMENTS,  
WHETHER PERFORMED WITH AN ANALOG OR A DIGITAL  
COMPUTER, ARE DELINEATED IN SOME DETAIL. DATA ARE  
PRESENTED WHICH WAS OBTAINED IN A SERIES OF ANALOG  
COMPUTER EXPERIMENTS IN GAS SURFACE INTERACTIONS  
USING SEVERAL VARIATIONS OF A VERY SIMPLE MODEL OF  
THE INTERACTION POTENTIAL, THE LATTICE, AND THE  
PHYSICAL STATE OF THE SOLID, PARTICULARLY  
TEMPERATURE. FOR THE MAJORITY OF THE RESEARCH, A  
NON-LINEAR COUPLING (POTENTIAL) WAS USED BETWEEN  
GAS PARTICLES AND SURFACE ATOM. SEVERAL MAJOR  
APPROXIMATIONS WERE MADE IN THE FORMULATION OF THE  
MODELS INVESTIGATED.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-605 984

TRW SPACE TECHNOLOGY LABS LOS ANGELES CALIF

LOW PRESSURE ELECTRICAL DISCHARGE STUDIES, (U)

DEC 59 72P KREBS, W. H. ; REED, A. C. ;  
REPT. NO. STL/TR-59-0000-09931  
CONTRACT: AF04 647 309

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ELECTRIC DISCHARGES, HIGH ALTITUDE),  
(\*GUIDED MISSILE COMPONENTS, MALFUNCTIONS), AIR, WATER,  
VAPOR, SPARKS, SECONDARY EMISSION, ELECTRICAL EQUIPMENT,  
LOW-PRESSURE RESEARCH, ELECTRODES, ELECTRICAL  
PROPERTIES, GEOMETRIC FORMS, ENCAPSULATION, CASTING,  
REVIEWS, BIBLIOGRAPHIES (U)  
IDENTIFIERS: BREAKDOWN (ELECTRICAL) (U)

THE REPORT CONCERNS ELECTRICAL BREAKDOWN OF AIR AT  
LOW PRESSURES OR HIGH ALTITUDES (70,000 TO 250,000  
FEET) DUE TO SECONDARY EMISSION. INFORMATION  
PERTINENT TO THE PROBLEM OF LOW FREQUENCY (0 TO  
1000 CPS) SPARKING WAS COMPILED THROUGH A  
LITERATURE SURVEY. A BIBLIOGRAPHY CONCERNING  
ELECTRICAL BREAKDOWN AT BOTH LOW AND HIGH FREQUENCIES  
WAS COMPILED. A TEST PROGRAM YIELDED THE FOLLOWING  
RESULTS: NO STATISTICALLY SIGNIFICANT DEVIATION  
FROM PASCHEN'S LAW WAS DETECTED. THE ADDITION  
OF WATER VAPOR TO THE AIR CONSTITUTING THE TEST  
ENVIRONMENT CAUSED A SIGNIFICANT LOWERING OF THE  
MINIMUM SPARKING VOLTAGE. RECOMMENDATIONS ARE MADE  
RELATIVE TO TEST PROGRAMS FOR MISSILE ELECTRICAL  
COMPONENTS EMPLOYING VOLTAGES HIGHER THAN 200 VOLTS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-611 752

MITRE CORP BEDFORD MASS

LEAD ATTACHMENT AND ENCAPSULATION TECHNIQUES FOR THIN  
FILM MICROCIRCUITS, (U)

FEB 65 16P EVERETT, PATRICK N. ;  
REPT. NO. W-6353  
CONTRACT: AF19 628 2390  
PROJ: 708 0  
MONITOR: ESD ; TDR-64-630

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*PACKAGED CIRCUITS, MANUFACTURING  
METHODS), (\*ENCAPSULATION, PACKAGED CIRCUITS),  
(\*MICROMINIATURIZATION (ELECTRONICS), ELECTRIC  
CONNECTORS), ELECTRIC WIRE, ATTACHMENT, METAL FILMS,  
BONDING, SOLDERING, EPOXY PLASTICS, MODULES  
(ELECTRONICS), RESISTORS, SEMICONDUCTOR DEVICES, PRINTED  
CIRCUITS (U)  
IDENTIFIERS: THIN FILMS (M)

THE TECHNIQUES DESCRIBED WERE DEVELOPED FOR  
ENCAPSULATING EXPERIMENTAL THIN FILM CIRCUITS  
DEPOSITED ON 0.5-INCH SQUARE GLASS SUBSTRATES. THE  
ENCAPSULATION IS EPOXY, WITH FINAL PACKAGE DIMENSIONS  
OF 0.6-INCH SQUARE X .125-INCH THICK. UP TO 32  
RIBBON LEADS EMERGE, ON .050 CENTERS, ARRANGED ON THE  
PERIPHERY OF THE PACKAGE. A FACTOR COMPLICATING  
THE ENCAPSULATION WAS THE REQUIREMENT THAT THE LEADS  
EMERGE ON THE FOUR EDGES OF THE UNIT. A MOLDING  
PROCESS USING SILICONE RUBBER MOLDS, AND A HYPODERMIC  
FILLING ARRANGEMENT WAS EVOLVED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-620 933

NATIONAL CASH REGISTER CO DAYTON OHIO CAPSULAR RESEARCH  
AND PRODUCT DEVELOPMENT DEPT

ENCAPSULATION OF VIRUSES.

(U)

DESCRIPTIVE NOTE: REPT. FOR MAR-OCT 64;  
AUG 65 40P ANDERSON, JERROLD L. BUTZ,  
S. DAVID;  
CONTRACT: AF29 601 6344  
PROJ: AF-8803  
MONITOR: AFWL TR-64-167

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•VIRUSES, ENCAPSULATION);  
(•ENCAPSULATION, BACTERIOPHAGES), (•BACTERIOPHAGES,  
ENCAPSULATION), VIABILITY, TOXICITY, ETHYL  
CELLULOSE, SPACE BIOLOGY, RADIATION EFFECTS,  
RADIOLOGICAL DOSAGE, DOSIMETERS, PHOTOGRAPHIC  
EMULSIONS (U)  
IDENTIFIERS: LYOPHILIZATION (U)

RESEARCH EFFORTS WERE DIRECTED TOWARD DEVELOPMENT  
OF A METHOD OF ENCAPSULATING VIRUSES IN SPHERES  
CONTAINING A PREDICTABLE PHAGE TITER TO BE USED IN  
BIOLOGICAL DOSIMETRY EXPERIMENTS. INITIAL STUDIES  
DEMONSTRATED THE ABILITY OF THE BACTERIOPHAGE TO  
UNDERGO LYOPHILIZATION AND ENCAPSULATION YIELDING A  
PRODUCT OF ADEQUATE VIABILITY. THE BUTAREZ  
TOLUENE ETHYLCELLULOSE ENCAPSULATION SYSTEM  
PROVED SATISFACTORY FOR PRODUCING SPHEROIDAL  
VIRUSETHYLCELLULOSE CAPSULES OF TWENTY-FIVE TO FIFTY  
MICRONS DIAMETER, THE MEAN DIAMETER BEING FORTY-TWO  
MICRONS. VIABILITY DETERMINATIONS YIELDED A PHAGE  
TITER OF  $1.7 \times 10$  TO THE 11TH POWER PHAGES PER GRAM  
OF CAPSULES; HENCE, A CAPSULE OF AVERAGE DIAMETER  
POSSESSED A THEORETICAL TITER OF  $8 \times 1000$  PHAGES.  
SIMULATED END-USE TESTS PROVED PHOTOGRAPHIC  
DEVELOPER CHEMICALS, SUCH AS COULD BE USED FOR THE  
PROCESSING OF VIRUS-BEARING NUCLEAR EMULSIONS, TO BE  
NONTOXIC TO THE ENCAPSULATED PHAGES. A MODIFICATION  
IN THE SCOPE OF THE PROGRAM DIRECTED THE CONCLUDING  
WORK TO THE PREPARATION OF CAPSULES LESS THAN FIFTEEN  
MICRONS IN DIAMETER. SAMPLES OF  
VIRUSETHYLCELLULOSE CAPSULES WERE SUBMITTED TO THE  
AIR FORCE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-625 956 9/1  
SYLVANIA ELECTRIC PRODUCTS INC WOBURN MASS SEMICONDUCTOR  
DIV

RELIABILITY ANALYSIS OF X-BAND TUNNEL DIODES. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.,  
DEC 65 74P DAVIS, CHARLES ; LUECK, ARTHUR

CONTRACT: AF30(602)-3487  
PROJ: AF-4519  
TASK: 451901  
MONITOR: RADC ; TR-65-291

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-615 498.

DESCRIPTORS: (•TUNNEL DIODES,  
RELIABILITY(ELECTRONICS)), X-BAND,  
MANUFACTURING METHODS, PROCESSING, SEMICONDUCTOR  
DEVICES, ENCAPSULATION, GERMANIUM ALLOYS, TIN  
ALLOYS, ARSENIC, GALLIUM (U)

THE REPORT PRESENTS AN ACCOUNT OF A MICROWAVE  
TUNNEL DIODE IMPROVEMENT PROGRAM, AND THE RESULTS  
OBTAINED FROM RELIABILITY TESTS PERFORMED ON DEVICES  
FABRICATED BY THE IMPROVED PROCESSES. A NEW SOLID  
STRUCTURE TUNNEL DIODE WAS DEVELOPED DURING THIS  
CONTRACT WHICH EXHIBITS SUPERIOR RELIABILITY  
CHARACTERISTICS TO ANY PREVIOUSLY TESTED TUNNEL  
DIODE. THE PROCESS AND FABRICATION DETAILS FOR  
THIS DEVICE ALONG WITH RELIABILITY DATA ARE INCLUDED  
IN THE REPORT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-628 537 11/9 9/1  
HARRY DIAMOND LABS WASHINGTON D C

LOW-LOSS STYRENE-TYPE FOAM-IN-PLACE ENCAPSULATING  
RESINS, (U)

OCT 65 24P ENGELHARDT, F. J. O. ;  
REPT. NO. TR-1308,  
PROJ: DA-1P523801A300 ,HDL-96300

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ENCAPSULATION, STYRENE PLASTICS),  
(\*STYRENE PLASTICS, ENCAPSULATION), (\*EXPANDED  
PLASTICS, ENCAPSULATION), STYRENES, PROPELLANTS,  
POLYMERIZATION, POWDERS, DIELECTRIC PROPERTIES,  
RADIOFREQUENCY, COMPRESSIVE PROPERTIES, DENSITY (U)  
IDENTIFIERS: POTTING COMPOUNDS (U)

LOW-DIELECTRIC-LOSS STYRENE-TYPE FOAM-IN-PLACE  
ENCAPSULATING RESINS ARE NOT AVAILABLE COMMERCIALY.  
SUCH A RESIN HAS NOW BEEN DEVELOPED. A  
PROPELLANT WAS ADDED TO THE CATALYZED STYRENE-  
POLYSTYRENE MIXTURE; AS THE TEMPERATURE OF THE  
POLYMERIZING RESIN ROSE, THE PROPELLANT EXPANDED THE  
RESIN INTO A CELLULAR STRUCTURE. HOMOGENEOUS FOAMS  
WERE OBTAINED IN THE PRESENCE OF FINELY POWDERED  
POLYMERS, WHICH ACTED AS BUBBLE NUCLEATORS. THE  
RESULTANT RIGID FOAMS HAD DIELECTRIC CONSTANTS  
RANGING FROM 1.2 TO 1.8, AND LOSS TANGENTS FROM  
0.0002 TO 0.001 OVER THE FREQUENCY RANGE 102 AND 108  
CPS. SOME OF THESE MATERIALS HAD REMARKABLY FLAT  
LOSS-FREQUENCY CURVES, LOSSES RANGING ONLY BETWEEN  
0.0004 AND 0.0005 OVER THE SAME FREQUENCY RANGE.  
DENSITIES WERE VARIED BETWEEN 0.194 AND 0.850 G/CU  
CM, OR BETWEEN 12 AND 53 LB/CU FT. THESE DATA  
INDICATE THE USEFULNESS OF THE NEW CELLULAR MATERIALS  
AS RF ENCAPSULATING RESINS. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-628 618 9/1 13/8  
PHILCO CORP LANSDALE PA

RESEARCH AND DEVELOPMENT LOW COST INTEGRATED CIRCUIT  
TECHNIQUES. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 15  
JUN-14 SEP 65,  
SEP 65 72P WAGNER, S. ; WALKER, M. ;  
REPT. NO. PHILCO R-506,  
CONTRACT: DA-28-043-AMC-01424(E),  
PROJ: DA-1P622001056  
TASK: 1P62200105602

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*INTEGRATED CIRCUITS, MANUFACTURING  
METHODS), (\*ENCAPSULATION, INTEGRATED CIRCUITS),  
(\*ELECTRIC CONNECTORS, INTEGRATED CIRCUITS),  
ELECTRIC WIRE, BONDING, SEMICONDUCTOR DEVICES,  
GLASS, COATINGS, DEPOSITION, EVAPORATION,  
VAPOR PLATING, PROCESSING, ASSEMBLING,  
PACKAGING, HERMETIC SEALS, PRINTED CIRCUITS (U)

THE USE OF AN ADHERENT IMPERVIOUS COATING FOR  
ENCAPSULATING SILICON INTEGRATED CIRCUITS, COMBINED  
WITH A BATCH MOUNTING AND INTERCONNECTION TECHNIQUE,  
WILL RESULT IN (1) DECREASED COST AS A RESULT OF  
PACKAGE ELIMINATION; (2) INCREASED PACKING  
DENSITY; (3) IMPROVED RELIABILITY DUE TO  
REDUCTION IN THE NUMBER OF CONTACTS AND ELIMINATION  
OF AU-AL THERMOCOMPRESSSION BONDS. THIS REPORT  
DESCRIBES A TECHNIQUE FOR SELECTIVE DEPOSITION OF 1  
TO 2 MICRON THICK GLASS ON SILICON INTEGRATED  
CIRCUITS AND ATTACHING THESE CIRCUITS TO A PRINTED  
CIRCUIT BOARD BY MEANS OF 'FLIP CHIP' MOUNTING.  
GLASS HAS BEEN DEPOSITED BY MEANS OF EVAPORATION  
AND PYROLYTIC VAPOR PLATING. EVAPORATION APPEARS  
TO HAVE SOME ADVANTAGES. EVALUATION OF TWO HIGH  
TEMPERATURE METALIZATION SYSTEMS (TI-AG-TI AND  
CR-AG-CR) HAS INDICATED SATISFACTORY  
PROPERTIES. A TEST MODEL EMPLOYING THESE  
TECHNIQUES HAS BEEN DESIGNED FOR ENVIRONMENTAL  
TESTING AND TECHNIQUE EVALUATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-628 833 9/5 12/4  
DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF MISSILE AND  
SPACE SYSTEMS DIV

STRESS ANALYSIS OF ENCAPSULATION MATERIALS FOR WELDED  
MODULES, (U)

FEB 66 61P SMITH, M. H. ;  
REPT. NO. SM-48410;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (MODULES(ELECTRONIC),  
ENCAPSULATION), (ENCAPSULATION, MATERIALS),  
(PACKAGING, TEST EQUIPMENT(ELECTRONICS)),  
WELDS, STRAIN GAGES, EPOXY PLASTICS,  
TRANSDUCERS, STRESSES, MATHEMATICAL ANALYSIS,  
EMBEDDING SUBSTANCES (U)

A STRAIN-GAUGE LOAD TRANSDUCER, SIMULATING AN  
AXIAL-LEADED DISCRETE COMPONENT, WAS DEVELOPED AND  
FABRICATED BY DAC TO MEASURE THE MAGNITUDE AND  
DIRECTION OF AXIAL STRESSES EXERTED BY AN  
ENCAPSULATING MATERIAL. THE EPOXY ENCAPSULATION  
MATERIALS EXHIBITED RESIDUAL COMPRESSIVE STRESSES DUE  
TO THE INITIAL CURE OF RESIN. THERMAL CYCLING  
SUBSTANTIALLY INCREASED THESE COMPRESSIVE STRESSES AT  
THE LOWEST TEMPERATURES. TENSILE STRESSES WERE  
RECORDED DURING THE ELEVATED TEMPERATURE PHASE OF THE  
TEST. COMPRESSIVE STRESSES WERE PRODUCED AS THE  
CYCLE WAS COMPLETED FORMING A CLOSED HYSTERESIS LOOP,  
CHARACTERISTIC OF THESE MATERIALS, ON THE STRESS VS.  
TEMPERATURE CURVE. WITHIN A TYPICAL CORDWOOD  
WELDED MODULE WITH COMPONENT DENSITY LEVELS OF 10-30  
PERCENT, THE STRESS LEVELS WERE REDUCED BY INCREASING  
LEVELS OF COMPONENT LOADING. THE LOW-DENSITY,  
MICROBALLOON-FILLED STYCAST 1090/11 EPOXY MATERIAL  
EXHIBITED SIGNIFICANTLY LOWER, MORE UNIFORM TENSILE  
AND COMPRESSIVE STRESSES THAN THE MEDIUM-DENSITY,  
MINERAL-FILLED HYSOL 4215/3561 (9709466, TYPE  
1) EPOXY MATERIAL WITHIN THIS SAME TEST  
CONFIGURATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-630 566 11/9 9/3 12/10  
NAVY MARINE ENGINEERING LAB ANNAPOLIS MD

EFFECT OF WATER ABSORPTION ON DIMENSIONAL STABILITY  
OF ELECTRIC MOTOR ENCAPSULATING MATERIALS. (U)

DESCRIPTIVE NOTE: RESEARCH AND DEVELOPMENT PHASE REPT.,  
MAR 66 15P TOBIN, JOHN F. ;  
REPT. NO. MEL-421/65,  
PROJ: S-F013 12 15,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*EPOXY PLASTICS, ENCAPSULATION);  
(\*ENCAPSULATION, EPOXY PLASTICS), (\*ELECTRIC  
MOTORS, ENCAPSULATION),  
PERFORMANCE(ENGINEERING); WATER;  
ABSORPTION(PHYSICAL), WINDING, DEEP SUBMERGENCE;  
STATISTICAL ANALYSIS, UNDERWATER EQUIPMENT,  
DEGRADATION, STABILITY (U)

EXPERIMENTS WITH EPOXY MATERIALS TO DETERMINE THEIR  
DIMENSIONAL CHANGE AS CAUSED BY WATER ABSORPTION  
(WHEN USED AS ENCAPSULATING MATERIALS FOR  
SUBMERSIBLE ELECTRIC MOTOR WINDINGS) WERE CONDUCTED  
WITH SUFFICIENT SAMPLE POPULATION TO ALLOW  
STATISTICAL ANALYSIS. THE STUDIES SHOWED THAT THE  
WATER ABSORPTION RATES OF THE THREE EPOXIES WERE  
IDENTICAL AND THAT DEEP SUBMERGENCE PRESSURES DID NOT  
ACCELERATE THE ABSORPTION RATE OR THE DIMENSIONAL  
GROWTH OF THE EPOXIES. DIMENSIONAL CHANGES DUE TO  
WATER ABSORPTION WERE FOUND TO BE VERY SMALL IN ALL  
CASES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-621 491 9/1 12/8  
PHILCO CORP LANSDALE PA

LOW COST INTEGRATED CIRCUIT TECHNIQUES.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2, 15  
SEP-14 DEC 65,  
APR 66 68P WAGNER, STURGER; WALKER, MAURO

CONTRACT: DA-28-043-AMC-01424(E)  
PROJ: 1P622001A056,  
MONITOR: ECOM, 01424-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-628 618.

DESCRIPTORS: (•INTEGRATED CIRCUITS, MANUFACTURING  
METHODS), (•ENCAPSULATION, INTEGRATED CIRCUITS),  
GLASS, EVAPORATION, DEPOSITION, CAPACITORS,  
PRINTED CIRCUITS, VAPOR PLATING, SILICON  
COMPOUNDS, DIOXIDES, MASKING, OXIDES, METALS,  
SILICON, VOLTAGE, CAPACITANCE, ALUMINUM,  
ETCHING

(U)

IDENTIFIERS: SILICON DIOXIDE

(U)

BOTH THE EVAPORATED AND PYROLYTIC GLASS DEPOSITION  
TECHNIQUES HAVE BEEN IMPROVED, RESULTING IN  
ENCAPSULATING DEPOSITS OF HIGHER QUALITY. THE  
PINHOLE PROBLEM ASSOCIATED WITH THE EVAPORATED GLASS  
HAS BEEN NEARLY ELIMINATED. ALSO, IMPROVED  
ADHERENCE HAS BEEN OBTAINED WITH THE PYROLYTICALLY  
DEPOSITED GLASS. GLASS DELINEATION WAS IMPROVED BY  
USING AN IMPROVED FIXTURE FOR EVAPORATION THROUGH A  
METAL MASK. SOME IMPROVEMENT WAS ALSO MADE IN THE  
DELINEATION OF PYROLYTICALLY DEPOSITED GLASS. IN  
THE WORK ON GLASS EVALUATION TECHNIQUES, A METHOD  
INVOLVING PRESSURIZED STEAM HAS PROVEN TO BE  
EFFECTIVE IN THE RELATIVE EVALUATION OF THE  
PASSIVATING PROPERTIES OF GLASS. ALSO, MOBILE  
CHARGE CONCENTRATION STUDIES WERE PERFORMED ON BOTH  
EVAPORATED AND PYROLYTICALLY DEPOSITED GLASS.  
PROBLEMS ENCOUNTERED IN METALIZATION INCLUDE  
INCREASED OHMIC CONTACT RESISTANCE AND POOR  
DELINEATION. SOME TEST MODELS HAVE BEEN PRODUCED,  
ALTHOUGH DEVICE AND METAL DELINEATION PROBLEMS HAVE  
DELAYED THE COMPLETION OF THE VEHICLES. THE  
VEHICLES HAVE BEEN SUBJECTED TO PRELIMINARY  
ELECTRICAL AND ENVIRONMENTAL EVALUATION. A PLAN  
FOR THE TESTING AND SPECIFICATION OF THE PRELIMINARY  
EXPLORATORY DEVELOPMENT MODELS WAS PREPARED.

(AUTHOR)

46

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UNCLASSIFIED

/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-635 183 9/1 13/8  
PHILCO CORP LANSDALE PA

LOW COST INTEGRATED CIRCUIT TECHNIQUES. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 3, 15 DEC 65-14  
MAR 66 (TECHNICAL).

JUL 66 44P WAGNER, STURGER ; WALKER,

MAURO ;

CONTRACT: DA-28-043-AMC-01424(E),

PROJ: DA-1P6-22001-A056,

TASK: 02,

MONITOR: ECOM 01424-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-631 491.

DESCRIPTORS: (•INTEGRATED CIRCUITS, MANUFACTURING  
METHODS), (•ENCAPSULATION, INTEGRATED CIRCUITS),  
COSTS, VAPOR PLATING, GLASS,  
PERFORMANCE (ENGINEERING) (U)

EVALUATION STUDIES OF EVAPORATED AND VAPOR PLATED  
GLASS HAVE LED TO THE RECOMMENDATION THAT ONLY THE  
VAPOR PLATED GLASS PROCESS BE USED IN CONTINUING THE  
REMAINDER OF THE PROGRAM. VAPOR PLATED GLASS HAS  
SHOWN SUPERIOR PROPERTIES AS A DIELECTRIC AND IN  
MOBILE CHARGE CONTENT. AN IMPORTANT CONSIDERATION  
IS THE COMPATIBILITY OF VAPOR PLATED GLASS WITH  
EXISTING METALIZATION SYSTEMS. A NUMBER OF  
CONSTRUCTION METHODS HAVE BEEN EVOLVED AND PROVEN  
FEASIBLE, ALTHOUGH SEVERAL PROBLEMS REMAIN.  
HOWEVER, THE PROBLEMS ARE BASICALLY THOSE OF  
PROCESSING AND THUS CAPABLE OF RESOLUTION DURING  
FABRICATION OF THE TEST VEHICLES. CONTINUED  
IMPROVEMENTS IN BATCH ASSEMBLY TECHNIQUES HAVE LED TO  
MORE REPRODUCIBLE AND BETTER DEFINED SOLDER JOINTS.  
FURTHER ELECTRICAL EVALUATIONS HAVE BEEN MADE OF  
DEVICES TO DETERMINE THE EFFECTS OF GLASSING. THESE  
EVALUATIONS HAVE ALSO EVIDENCED THE SUPERIORITY OF  
VAPOR PLATED GLASS. AN ERROR IN ONE OF THE MASKS  
PROVED TO BE RESPONSIBLE FOR A SATURATION VOLTAGE  
PROBLEM. A SPECIFICATION QUESTION HAS ARISEN  
BECAUSE OF THE RATHER WIDE RANGE OF LEAKAGE CURRENTS  
RESULTING FROM GOLD DOPING. THIS LEAKAGE CURRENT  
VARIATION MADE THE TEST VEHICLES WHICH WERE  
CONSTRUCTED UNSATISFACTORY FOR ENVIRONMENTAL TESTING.  
A REVISED APPROACH TO THE FINAL EXPLORATORY  
DEVELOPMENT MODELS IS RECOMMENDED TO PERMIT EMPHASIS  
ON THE CONSTRUCTION TECHNIQUES WHICH UTILIZE VAPOR  
PLATED GLASS. (AUTHOR)

(U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-646 915 11/9 9/3  
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS  
LAB

THE IMPROVEMENT OF ENCAPSULATING FOAMS AND QUALITY  
ASSURANCE OF POTTING PLASTIC. (U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.,  
AUG 66 39P WINCKLER, G. A. F.; EVANS, R. C.

REPT. NO. TG-817  
CONTRACT: NOW-62-0604  
MONITOR: IDEP 501.32.19.45-S6-01

UNCLASSIFIED REPORT

DESCRIPTORS: (•EXPANDED PLASTICS; •ENCAPSULATION);  
(•EMBEDDING SUBSTANCES, TEST METHODS); CIRCUITS,  
DAMAGE, PRESSURE, VISCOSITY, HARDENING,  
CATALYSTS, QUALITY CONTROL, DIELECTRIC PROPERTIES;  
RESISTANCE(ELECTRICAL), DENSITY, INSTRUCTION  
MANUALS (U)

PLASTIC FOAMS USED FOR ENCAPSULATING ELECTRONIC  
CIRCUITS MAY, DURING THEIR FORMATION, EXERT  
SUFFICIENT PRESSURES TO DAMAGE COMPONENTS AND  
CONNECTIVE WIRING. THIS PROBABLY CAUSED BY THE  
INCREASING VISCOSITY OF THE PLASTIC WHILE GAS IS  
STILL BEING GENERATED. THE DANGER MAY BE  
ALLEVIATED BY ALTERING THE FORMULATION CHEMICALLY SO  
THAT GAS GENERATION IS COMPLETED BEFORE THE PLASTIC  
BEGINS TO HARDEN. THE CONSEQUENCES WHICH WOULD  
RESULT FROM THE USE OF A MISLABELLED OR SUBSTANDARD  
CAN OF POTTING PLASTIC IN FLIGHT HARDWARE ARE SO  
SERIOUS THAT EACH CAN MUST BE INDIVIDUALLY TESTED TO  
ELIMINATE THAT POSSIBILITY. THIS MAY READILY BE  
ACCOMPLISHED BY CASTING A TEST DISK AND THEN  
MEASURING ITS DIELECTRIC CONSTANT, VOLUME  
RESISTIVITY, SURFACE RESISTIVITY AND DENSITY. THE  
ELECTRICAL TESTING CAN BE PERFORMED IN LESS THAN TEN  
MINUTES AND IS, THEREFORE, FEASIBLE AS A STANDARD  
QUALITY ASSURANCE PROCEDURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-648 420 13/8 11/9 9/3  
PLASTICS TECHNICAL EVALUATION CENTER DOVER N J

ENCAPSULATION OF ELECTRONIC PARTS IN PLASTICS: A  
REVIEW,

(U)

FEB 67 67P MOLZON, ARNOLD E. ;  
REPT. NO. PLASTEC-29

UNCLASSIFIED REPORT

DESCRIPTORS: (•ELECTRONIC EQUIPMENT;  
ENCAPSULATION), (•ENCAPSULATION, PLASTICS),  
COATINGS, FOAMS, EMBEDDING SUBSTANCES, POLYMERS,  
CASTING, MATERIAL FORMING, MOLDING, THERMAL  
PROPERTIES

(U)

THE ADVANCES AND TRENDS IN THE PLASTICS  
ENCAPSULATION OF ELECTRONIC PARTS AND CIRCUITS ARE  
REVIEWED. IN LESS THAN 20 YEARS THIS INDUSTRY HAS  
DEVELOPED INTO A HIGH PRODUCTION OPERATION.  
INCLUDED IN THIS REPORT ARE: TYPES OF PLASTICS  
USED, MATERIAL REQUIREMENTS AND MATERIAL CONSUMPTION.  
KNOWN MATERIAL SUPPLIERS AND EQUIPMENT SUPPLIERS  
ARE LISTED AND THEIR PRODUCTS IDENTIFIED. ALSO  
TABULATED ARE 47 PERTINENT SPECIFICATIONS, 111  
CONTRACTS (WITH REPORTS), AND 57 GOVERNMENT  
LABORATORY REPORTS. THESE REFLECT THE MATERIALS  
RESEARCH AND DEVELOPMENT IN THE DEPARTMENT OF  
DEFENSE, IN NASA, AND IN INDUSTRY. THE  
AVAILABILITY OF INFORMATION IS ALSO DISCUSSED. THE  
REPORT CONTAINS A BIBLIOGRAPHY OF 207 ITEMS ON  
ENCAPSULATION.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-660 349 9/1 14/4  
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

PRELIMINARY INVESTIGATION OF PLASTIC ENCAPSULATED  
TRANSISTORS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
SEP 67 17P NAKIM, E. B. ; CANEPA, R. ;  
REPT. NO. ECOM-2879  
PROJ: DA-1H6-22001-A-056  
TASK: 1H6-22001-A-056-01-14

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TRANSISTORS, ENCAPSULATION),  
PERFORMANCE(ENGINEERING), PLASTICS,  
RELIABILITY(ELECTRONICS), ENVIRONMENTAL TESTS,  
EPOXY PLASTICS, SILICONE PLASTICS (U)

AN EVALUATION OF EPOXY AND SILICONE TRANSISTOR  
PACKAGES WAS CARRIED OUT ON SEVEN DEVICE TYPES.  
ALL PACKAGES APPEARED FAVORABLE UNDER STANDARD  
MIL TESTS BELOW 170C. HOWEVER, A NEW REALISTIC  
ENVIRONMENTAL TEST HAS BEEN DEVISED WHICH APPEARS TO  
DETECT POTENTIALLY UNRELIABLE DEVICES IN LESS THAN  
500 HOURS. THE RESULTS FROM THIS TEST INDICATE  
THAT SILICONE PACKAGES ARE GENERALLY MORE DESIRABLE  
THAN EPOXY. HOWEVER, THIS CAN VARY BETWEEN  
MANUFACTURERS AND SOME EPOXY UNITS HAVE BEEN FOUND TO  
BE AS STABLE AS SILICONE, DEPENDING ON THE  
MANUFACTURER. RESULTS OF TESTS ARE DISCUSSED AS  
WELL AS VARIOUS PROBLEM AREAS. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-669 850 9/1  
ITT SEMICONDUCTOR PRODUCTS LABS PALO ALTO CALIF

FOUR-LAYER DIODE DEVELOPMENT PROGRAM. (U)

DESCRIPTIVE NOTE: FINAL REPT.,  
APR 68 74P SCARLETT, ROBERT M. ;  
CONTRACT: AF 30(602)-4045  
PROJ: AF-5573  
MONITOR: RADC TR-68-136

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ELECTRONIC SWITCHES,  
DIODES(SEMICONDUCTOR)),  
(\*DIODES(SEMICONDUCTOR), MANUFACTURING  
METHODS), MODULATORS,  
RELIABILITY(ELECTRONICS), VOLTAGE,  
FAILURE(ELECTRONICS), THERMAL STABILITY,  
LEAKAGE(ELECTRICAL), SILICON, BORON,  
DIFFUSION, SURFACE PROPERTIES, ENCAPSULATION (U)

THIS EFFORT IS THE CULMINATION OF SEVERAL YEARS  
WORK TO IMPROVE AND DEMONSTRATE THE FOUR-LAYER DIODE  
IN HIGH POWER SWITCH SERVICE. THE FABRICATION OF  
THE DEVICE, ITS CHARACTERISTICS AND AN EVALUATION OF  
PERFORMANCE OF THE DEVICE IN A HIGH VOLTAGE HIGH  
CURRENT ENVIRONMENT IS DISCUSSED. SEVERAL DEVICE  
PROBLEMS BECAME EVIDENT DURING THIS EFFORT AND ARE  
CHARACTERIZED IN THE TEXT. THE FAILURE RATES,  
THERMAL DISSIPATION PROBLEMS, VOLTAGE DISTRIBUTION,  
REPETITION RATE LIMITATIONS AND GENERAL DEVICE  
BEHAVIOR ARE THOROUGHLY DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-671 797 9/5  
NAVAL AMMUNITION DEPOT CRANE IND

MICRO-NOTES. INFORMATION ON MICROELECTRONICS FOR  
NAVY EQUIPMENTS.

(U)

JUL 68 222P  
REPT. NO. NAD-CR-MICRO-NOTES-24  
MONITOR: IDEP 515.00.00.00-X9-10

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY NAVAL AIR SYSTEMS  
COMMAND, WASHINGTON, D.C. AND NAVAL ELECTRONICS  
SYSTEM COMMAND, WASHINGTON, D.C. SEE ALSO AD-  
667 719.

DESCRIPTORS: (\*NAVAL EQUIPMENT;  
\*MICROMINIATURIZATION(ELECTRONICS));  
(\*INTEGRATED CIRCUITS, TESTS), RADIO RECEIVERS;  
FREQUENCY SHIFT CONVERTERS, RADIATION DAMAGE,  
GATES(CIRCUITS), LOGIC CIRCUITS, SWITCHING  
CIRCUITS, RELAXATION OSCILLATORS, AMPLIFIERS,  
PERFORMANCE(ENGINEERING), SEMICONDUCTOR DEVICES,  
ENCAPSULATION

(U)

CONTENTS INCLUDE: MICROELECTRONICS FSK  
RECEIVER; EVALUATION OF DIGITAL UNITS; EVALUATION  
OF ANALOG UNITS; PLASTIC ENCAPSULATED SEMICONDUCTOR  
DEVICES AND MICROCIRCUITS; INTRODUCTION TO  
RADIATION EFFECTS IN INTEGRATED CIRCUITS.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-689 224 9/5  
ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y

FAILURE MECHANISMS IN PLASTIC ENCAPSULATED  
MICROCIRCUITS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.;  
MAY 69 34P TAMBURRINO, ALFRED L. ;  
KAPFER, VINCENT C. ;  
REPT. NO. RADC-TR-69-111  
PROJ: AF-5519  
TASK: 551906  
MONITOR: IDEP 515.00.00.00-F9-01

UNCLASSIFIED REPORT

DESCRIPTORS: (\*INTEGRATED CIRCUITS,  
RELIABILITY(ELECTRONICS)); TEST METHODS,  
ENCAPSULATION, EPOXY PLASTICS, PHENOLIC PLASTICS,  
SILICONE PLASTICS, THERMAL STRESSES, SALT SPRAY  
TESTS, LIQUID IMMERSION TESTS, STRESSES,  
CORROSION, ALUMINUM ALLOYS,  
FAILURE(MECHANICS)

(U)

THIS PAPER DEALS WITH THE QUESTION OF MILITARY  
ACCEPTANCE OF MICROCIRCUITS ENCAPSULATED IN PLASTIC  
MATERIALS. A DISCUSSION OF MILITARY APPLICATIONS  
AND REQUIREMENTS AND THEIR RELATION TO DEVICE  
QUALIFICATION TESTING AND SCREENING IS GIVEN. IT  
IS POINTED OUT THAT QUALIFICATION TESTS ARE BASED  
NEITH. UPON ABSOLUTE MINIMUM STANDARDS NOR VALIDLY  
DERIVED ACCELERATION FACTORS, BUT ON EXPERIENCE WITH  
SIMILAR DEVICES, AND KNOWLEDGE OF THE EXPECTED  
CAPABILITIES OF GOOD DEVICES. EPOXY, PHENOLIC, AND  
SILICONE ENCAPSULATED MICROCIRCUITS HAVE BEEN  
SUBJECTED TO A VARIETY OF HIGH STRESS TESTS AND FOUR  
BASIC TYPES OF FAILURES OBSERVED: EXTERNAL SURFACE  
CONDUCTION, INTERNAL (SILICON CHIP) SURFACE  
EFFECTS, ALUMINUM METALLIZATION CORROSION, AND BOND  
BREAKAGE DUE TO THERMAL MISMATCH. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-690 445 9/5  
NAVAL AMMUNITION DEPOT CRANE IND

MICRO-NOTES. INFORMATION ON MICROELECTRONICS  
FOR NAVY EQUIPMENTS. (U)

JUL 69 131P  
REPT. NO. NAD-CR-MICRO-NOTES-28

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY NAVAL AIR SYSTEMS  
COMMAND, WASHINGTON, D. C., AND NAVAL  
ELECTRONICS SYSTEM COMMAND, WASHINGTON, D. C.

DESCRIPTORS: (•NAVAL EQUIPMENT,  
•MICROMINIATURIZATION(ELECTRONICS)),  
(•INTEGRATED CIRCUITS, NAVAL RESEARCH),  
SEMICONDUCTOR DEVICES, ENCAPSULATION, LOGIC  
CIRCUITS, TABLES, ENVIRONMENTAL TESTS, ION  
BOMBARDMENT, DOPING, GATES(CIRCUITS),  
RELIABILITY(ELECTRONICS) (U)  
IDENTIFIERS: LSIC(LARGE SCALE INTEGRATED  
CIRCUITS), LARGE SCALE INTEGRATED CIRCUITS (U)

THE REPORT DISCUSSES THE RESULTS OF A JOINT EFFORT  
TO DISSEMINATE INFORMATION ON EVALUATION,  
APPLICATION, AVAILABILITY, RESEARCH AND DEVELOPMENT,  
AND STANDARDIZATION ACTIVITY PERTAINING TO STATE-OF-  
THE-ART MICROELECTRONIC CIRCUITS, DEVICES, AND  
MATERIALS, WITH A VIEW TOWARD AVOIDING DUPLICATION OF  
EFFORT AND MAKING MAXIMUM USE OF TECHNICAL RESOURCES.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-703 292 9/5

GENERAL MOTORS CORP KOKOMO IND DELCO RADIO DIV

RELIABILITY EVALUATION OF PLASTIC INTEGRATED  
CIRCUITS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT. 9 JAN-9 NOV 69,  
FEB 70 84P BEVINGTON, JOHN R. ;LITTLE,

DAVID R. ;

CONTRACT: F30602-69-C-0154

PROJ: AF-5519

TASK: 551906

MONITOR: RADC, IDEP

TR-69-451, 515.00.00.00-F9-

07

UNCLASSIFIED REPORT

DESCRIPTORS: (\*INTEGRATED CIRCUITS,  
RELIABILITY(ELECTRONICS)), (\*ENCAPSULATION,  
INTEGRATED CIRCUITS), PLASTICS,  
MOISTUREPROOFING, THERMAL STRESSES,  
FAILURE(MECHANICS)

(U)

INSUFFICIENT DATA EXISTS WITH RESPECT TO THE LONG  
TERM STABILITY OF PLASTIC-ENCAPSULATED MICROCIRCUITS.  
OF SPECIAL INTEREST IS THE DEGREE OF SUSCEPTIBILITY  
OF THESE PLASTIC PACKAGES TO SUCH ENVIRONMENTAL  
STRESSES AS MOISTURE RESISTANCE (WITH AND WITHOUT  
BIAS) AND THERMAL SHOCK. THE OBJECTIVE OF THIS  
STUDY IS TO DETERMINE THE SUITABILITY OF  
REPRESENTATIVE, PRODUCTION, PLASTIC-ENCAPSULATED  
INTEGRATED CIRCUITS FOR MILITARY APPLICATIONS, AND TO  
DEVELOP METHODS AND TECHNIQUES FOR ASSESSING AND  
ASSURING THE RELIABILITY OF SUCH CIRCUITS. A SERIES  
OF SCREENS AND TESTS ARE BEING PERFORMED ON SELECTED  
CIRCUITS, AND DETAILED FAILURE ANALYSES ARE BEING  
PERFORMED TO DETERMINE THE FAILURE MODES AND  
MECHANISMS CHARACTERISTIC OF THE VARIOUS TYPES OF  
PLASTIC ENCAPSULATIONS. THE RESULTS TO DATE HAVE  
INDICATED CONTRASTS IN PERFORMANCE BETWEEN PACKAGE  
TYPES AND BETWEEN SCREENED AND UNSCREENED GROUPS, AS  
WELL AS SIGNIFICANT LOT-TO-LOT VARIATIONS. SEVERAL  
TENTATIVE CONCLUSIONS HAVE BEEN DRAWN BASED ON TEST  
RESULTS TO DATE; HOWEVER, FINAL CONCLUSIONS MUST  
AWAIT COMPLETION OF THIS STUDY. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-704 925 9/5  
DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA

PACKAGED CIRCUITS. VOLUME 1.

(U)

DESCRIPTIVE NOTE: REPORT BIBLIOGRAPHY MAR 59-FEB 69.  
APR 70 159P  
REPT. NO. DDC-TAS-70-39-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-868 525 AND  
VOLUME 3, AD-508 800.

DESCRIPTORS: (\*PACKAGED CIRCUITS,  
\*BIBLIOGRAPHIES), PACKAGING, ELECTRONIC  
EQUIPMENT, INTEGRATED CIRCUITS,  
MICROMINIATURIZATION(ELECTRONICS),  
RELIABILITY(ELECTRONICS),  
MODULES(ELECTRONICS), PRINTED CIRCUITS,  
MOLECULAR ELECTRONICS, ELECTRIC CONNECTORS,  
MANUFACTURING METHODS, WELDING, SEMICONDUCTOR  
DEVICES, ENCAPSULATION, COMPUTERS, DATA STORAGE  
SYSTEMS, DATA PROCESSING SYSTEMS, COMPUTER LOGIC (U)  
IDENTIFIERS: THIN FILMS (U)

SELECTIVE REFERENCES INCLUDE: COMPATIBLE  
TECHNIQUES FOR INTEGRATED CIRCUITRY; RESULTS OF  
STUDIES TO DETERMINE OPTIMUM PACKAGING TECHNIQUES FOR  
THE ELECTRONIC EQUIPMENT AND THE SHOCK LEVELS THAT  
THE DIFFERENT PACKAGES AND CERTAIN ELECTRONIC  
COMPONENTS COULD WITHSTAND; A SYSTEM FOR COMPUTER-  
AIDED SELECTION AND ASSIGNMENT OF ELECTRONIC MODULES;  
AN ELECTRONIC PACKAGING PROGRAM WAS INITIATED TO  
DEVELOP AND EVALUATE INTEGRATED CIRCUIT PACKAGING  
TECHNIQUES APPLICABLE TO UNMANNED SCIENTIFIC  
SPACECRAFT DATA SYSTEM; AND ALL ASPECTS OF  
MICROCIRCUIT PACKAGING ARE STUDIED AND EACH OF THE  
THREE BASIC APPROACHES TO THE PACKAGING OF  
MICROCIRCUITS ARE INVESTIGATED AND EVALUATED, NAMELY,  
TYPE OF CONTAINERS, GLASS AND METAL FLAT PACKAGES,  
AND ENCAPSULATED TYPE PACKAGES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-715 108 9/5  
NAVAL AMMUNITION DEPOT CRANE IND

MICRO-NOTES. INFORMATION ON MICROELECTRONICS  
FOR NAVY EQUIPMENTS. (U)

OCT 70 80P  
REPT. NO. NAD-CR-MICRO NOTES-30

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT DATED 1 FEB 70,  
AD-702 751.

DESCRIPTORS: (MICROMINIATURIZATION(ELECTRONICS),  
NAVAL EQUIPMENT), INTEGRATED CIRCUITS, COUNTING  
METHODS, CORRELATORS, STANDARDIZATION,  
ENCAPSULATION, PLASTICS (U)

CONTENTS: A CONTINUING REPORT ON EFFORTS TO  
DETERMINE THE THEORY AND METHODS REQUIRED TO  
FABRICATE MICROCIRCUIT ULTRA HIGH SPEED PRESCALERS;  
A SUMMARY OF THE WORK DONE ON DEVELOPMENT OF AN  
LSI CORRELATOR; MINUTES OF THE SECOND MEETING OF  
THE DOD/NASA COMMITTEE ON RESEARCH AND  
DEVELOPMENT OF PLASTIC DEVICES AND MATERIALS (WGR  
AND D); A COMPLETE SUMMARY OF WORK-TO-DATE DONE  
ON EVALUATION OF PLASTIC ENCAPSULATED INTEGRATED  
CIRCUITS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-715 984 9/5  
ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y

STRESS INDUCED INTERMITTENT FAILURES IN  
ENCAPSULATED MICROCIRCUITS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
OCT 70 60P HABERER, JOHN R. ;  
REPT. NO. RADC-TR-70-213  
PROJ: DE-69-3

UNCLASSIFIED REPORT

DESCRIPTORS: (•INTEGRATED CIRCUITS,  
FAILURE(ELECTRONICS)),  
RELIABILITY(ELECTRONICS); ENCAPSULATION,  
CIRCUIT INTERCONNECTIONS

(U)

THE PROBLEM OF TEMPERATURE INTERMITTENT OPERATION  
IN ENCAPSULATED INTEGRATED CIRCUIT IS DISCUSSED AND A  
TECHNIQUE IS PRESENTED WHICH HAS BEEN EFFECTIVE IN  
DETECTING POTENTIAL FAILURES RESULTING FROM  
METALLIZATION, BOND OR LEAD WIRE TEMPERATURE  
INTERMITTENTS. THESE ARE THE MAIN CAUSES OF  
INTERMITTENT OPERATION IN ENCAPSULATED MICROCIRCUITS  
AT PRESENT, AND THIS TECHNIQUE SHOULD LEAD TO  
IMPROVEMENT IN ENCAPSULATED DEVICE RELIABILITY IF  
IMPLEMENTED AS A SCREENING OR QUALIFICATION TEST.  
THE INSTRUMENTATION USED AT RADC FOR THIS  
TECHNIQUE, CALLED THE MONITORED THERMAL CYCLE  
TEST (MTC), IS PRESENTED AND A PROPOSED STANDARD  
TEST METHOD, BASED ON THIS TEST IS INCLUDED AS AN  
APPENDIX. SEVERAL REPRESENTATIVE DEVICE FAILURE  
ANALYSIS SUMMARIES ARE INCLUDED TO ILLUSTRATE THE  
CAUSE OF TYPICAL ENCAPSULATED INTEGRATED CIRCUIT  
INTERMITTENTS RESULTING FROM FAILURE OF THE LEAD  
WIRE-BOND-INTERCONNECT SYSTEM. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-718 336 13/9 20/11  
NAVAL AIR ENGINEERING CENTER PHILADELPHIA PA ENGINEERING  
DEPT (SI)

A STUDY IN TERMINAL BENDING OF UNIFORM AND  
ENCAPSULATED WIRE ROPE WITH LINEAR AND NON-  
LINEAR CONSTITUTIVE EQUATIONS;

(U)

JAN 71 114P BLACK, ROBERT ;  
REPT. NO. NAEC-ENG-7683  
PROJ: A3405373/2008/1F32461402

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CABLES(MECHANICAL); BENDING);  
LOADING(MECHANICS); BENDING; DEFORMATION;  
CORDAGE; STRAIN(MECHANICS); ENCAPSULATION;  
ARRESTING GEAR

(U)

THE REPORT DEVELOPS EQUATIONS FOR THE CALCULATION  
OF THE TERMINAL FORCES AND MOMENTS ABOUT A BUILT-IN  
END OF A WIRE ROPE WHEN THE UPSTREAM END IS SUBJECTED  
TO A TENSILE LOAD APPLIED AT AN ANGLE MEASURED FROM  
THE DIRECTION TAKEN BY THE LONGITUDINAL AXIS OF THE  
ROPE AT THE POINT OF ATTACHMENT. SOLUTIONS FOR  
THESE FORCES AND MOMENTS AND THE ROPE CURVATURE ARE  
GIVEN ALONG THE LENGTH OF THE CABLE AND THE EFFECT OF  
THESE QUANTITIES UPON THE STRANDS ARE DETERMINED.  
THE ANALYSES ARE PRESENTED FOR WIRE ROPE LINEAR AND  
NONLINEAR CONSTITUTIVE EQUATIONS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-722 043

9/5

GENERAL MOTORS CORP KOKOMO IND DELCO ELECTRONICS DIV

RELIABILITY EVALUATION OF PLASTIC INTEGRATED  
CIRCUITS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 9 JAN 69-9 SEP 70,

JAN 71 171P BEVINGTON, JOHN R. ; COOK,

JAMES P. ; LITTLE, DAVID R. ; SINGLE, L. V. ;

CONTRACT: F30602-69-C-0154

MONITOR: RADCGIDEP

TR-71-8, 515.00.00.00-F9-10

UNCLASSIFIED REPORT

DESCRIPTORS: (\*INTEGRATED CIRCUITS,

\*ENCAPSULATION), PLASTICS,

RELIABILITY(ELECTRONICS), ACCEPTABILITY

(U)

INSUFFICIENT INFORMATION HAS BEEN AVAILABLE WITH RESPECT TO THE LONG-TERM STABILITY OF PLASTIC-ENCAPSULATED MICROCIRCUITS. OF SPECIAL INTEREST IS THE DEGREE OF SUSCEPTIBILITY OF THESE PLASTIC PACKAGES TO SUCH ENVIRONMENTAL STRESSES AS MOISTURE RESISTANCE (WITH AND WITHOUT BIAS) AND THERMAL SHOCK. THE OBJECTIVES OF THE STUDY ARE TO DETERMINE THE SUITABILITY OF REPRESENTATIVE, PRODUCTION, PLASTIC-ENCAPSULATED INTEGRATED CIRCUITS FOR MILITARY APPLICATIONS, AND TO DEVELOP METHODS AND TECHNIQUES FOR ASSESSING AND ASSURING THE RELIABILITY OF SUCH CIRCUITS. A SERIES OF SCREENS AND TESTS WERE PERFORMED ON SELECTED CIRCUITS, AND DETAILED FAILURE ANALYSES WERE MADE TO DETERMINE THE FAILURE MODES AND MECHANISMS CHARACTERISTIC OF THE VARIOUS TYPES OF PLASTIC ENCAPSULATION. THE REPORT INCLUDES DETAILED TEST RESULTS FROM LONG-TERM TESTS AND FROM SHORT-TERM HIGHLY ACCELERATED TESTS. COMPARISONS ARE MADE BETWEEN PACKAGE TYPES UNDER THE SAME STRESS CONDITIONS, BETWEEN SCREENED AND UNSCREENED GROUPS, AND BETWEEN STANDARD AND ACCELERATED TEST RESULTS. A STRESS TO DESTRUCTION TEST PROGRAM, INCLUDING EQUIVALENT HERMETIC TYPES FOR DIRECT COMPARISON WITH PLASTIC-ENCAPSULATED DEVICES UNDER SELECTED ACCELERATED TEST CONDITIONS, WAS PERFORMED.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-722 405 9/5 1/4  
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

THERMAL ANALYSIS. ADVANCED AUTOPILOT  
FLATPAK MODULE DESIGN RECOMMENDATIONS;

(U)

DEC 67 38P HALL, J. E. ;  
REPT. NO. GDC-8TD67-144  
CONTRACT: AF 04(695)-710  
MONITOR: SAMSO TR-71-86

UNCLASSIFIED REPORT

DESCRIPTORS: (MODULES(ELECTRONICS)), THERMAL  
ANALYSIS), (AUTOMATIC PILOTS,  
MODULES(ELECTRONICS)), (ENCAPSULATION,  
MODULES(ELECTRONICS)), DESIGN, THERMAL  
INSULATION, THERMAL CONDUCTIVITY, HEAT SINKS,  
EXPANDED PLASTICS, ISOCYANATE PLASTICS, EPOXY  
PLASTICS, COMPOSITE MATERIALS, COPPER  
IDENTIFIERS: METAL PARTICLE COMPOSITES

(U)

(U)

A THERMAL MODEL OF A TYPICAL ELECTRONIC FLATPAK  
MODULE WAS CONSTRUCTED AND ANALYZED. POLYURETHANE  
FOAM AND ALUMINUM-FILLED EPOXY WERE ASSESSED FOR USE  
AS ENCAPSULATION MATERIALS. THE VALUE OF UTILIZING  
COPPER SHEETS AS HEAT CONDUCTIVE PATHS FROM HEAT  
GENERATORS TO THE FLATPAK FRAMES WAS ASSESSED. FROM  
A LARGE NUMBER OF DIGITAL COMPUTER CALCULATIONS,  
ACCUMULATED DATA WERE CORRELATED WITH SOME  
PRELIMINARY TEST DATA. WITH THIS INFORMATION,  
DESIGN RECOMMENDATIONS WERE MADE TO ASSIST THE  
FLATPAK DESIGNER. IN GENERAL, THE ECONOMICS OF  
MATERIAL AND FABRICATION COSTS MUST BE COMPARED, BY  
THE DESIGNER, WITH THERMAL CHARACTERISTICS OF THE  
ENCAPSULATION METHODS. TEMPERATURES ATTAINED BY  
CRITICAL HEAT GENERATING ELEMENTS ARE DEPENDENT  
UPON: (1) LOCATION RELATIVE TO THE FLATPAK  
FRAME, (2) LENGTH OF ELECTRICAL LEADS AND  
CONNECTIONS, AND (3) CONTACT RESISTANCES OF THE  
ELECTRICAL CONNECTIONS AND HEAT CONDUCTIVE SHEETS.  
RECOMMENDATIONS INCLUDE A TABULATION OF ALLOWABLE  
THERMAL RESISTANCE FOR EACH HEAT GENERATOR  
CONFIGURATION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-722 448 11/3 4/2  
NATIONAL CASH REGISTER CO DAYTON OHIO CAPSULAR RESEARCH  
AND PRODUCT DEVELOPMENT DEPT

MICROENCAPSULATED CLOUD SEEDING  
MATERIALS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 15 AUG 69-14 JAN 71,  
FEB 71 158P ANDERSON, JERROLD L. ;  
CONTRACT: F19628-70-C-0011  
PROJ: AF-8620, ILIR-7-69  
TASK: 862008, ILIR-7-69-01  
MONITOR: AFCRL 71-0151

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ETHYL CELLULOSE, COATINGS),  
(\*ARTIFICIAL PRECIPITATION, MATERIALS), (\*SODIUM  
CHLORIDE, \*ENCAPSULATION), (\*UREA,  
ENCAPSULATION), POLYMERS, FOG, PARTICLE SIZE,  
PHOSPHATES, OPTICAL PROPERTIES, ADSORPTION,  
PRODUCTION, SCATTERING, FEASIBILITY STUDIES,  
POWDERS

(U)

IDENTIFIERS: \*CLOUD SEEDING,  
MICROENCAPSULATION

(U)

A PROCESS WAS DEVELOPED FOR ENCAPSULATING  
HYGROSCOPIC, CLOUD-SEEDING AGENTS, SODIUM CHLORIDE  
AND UREA. THE ENCAPSULATION PROCESS INVOLVES  
DEPOSITING THE COATING POLYMER, ETHYLCELLULOSE, ONTO  
FINELY DIVIDED POWDERS, USING A PHASE SEPARATION-  
COACERVATION TECHNIQUE. THE PROCESS PRODUCES SMALL  
ENCAPSULATED AGGREGATES, THE SIZE AND DISTRIBUTION OF  
WHICH CAN BE VARIED. ENCAPSULATED MATERIALS  
PREPARED BY THE PROCESS ARE UNIQUE IN THAT THEY ARE  
VOID, ESSENTIALLY, OF POWDER FINES. LABORATORY  
TESTS OF BOTH ENCAPSULATED SODIUM CHLORIDE AND UREA  
PROVED THE POWDERS TO BE RESISTANT TO CLUMPING AND  
CAKING ASSOCIATED WITH PREMATURE MOISTURE SORPTION  
OCCURRING DURING STORAGE AND HANDLING. THE  
ENCAPSULATION COATING POLYMER, ETHYLCELLULOSE, IS  
WATER INSOLUBLE, BUT IS PERMEABLE TO WATER VAPOR,  
WATER AND SOLUTES. HENCE, WATER SORPTION AND  
PARTICLE GROWTH PROPERTIES RESULTING FROM EXPOSURE OF  
THE ENCAPSULATED PARTICLES TO HUMID ATMOSPHERES ARE  
EFFECTED BY DIFFUSION-MASS TRANSPORT PROCESSES.  
LABORATORY TESTING OF ENCAPSULATED SODIUM CHLORIDE  
AND UREA MATERIALS IN SIMULATED WARM FOG ATMOSPHERES  
REVEALED WATER SORPTION CHARACTERISTICS WHICH WERE  
COMPARABLE TO UNENCAPSULATED PARTICLES HAVING  
EQUIVALENT DIMENSION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-726 018 14/2 13/8 9/1  
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

1.5-KW SOLID-STATE POWER CYCLER. (U)

DESCRIPTIVE NOTE: RESEARCH AND DEVELOPMENT TECHNICAL  
REPT.,

APR 71 18P MALINOWSKI, GREGORY J. ;  
REPT. NO. ECOM-3410  
PROJ: DA-1-H-662705-A-056  
TASK: 1-H-662705-A-05601

UNCLASSIFIED REPORT

DESCRIPTORS: (\*EMBEDDING SUBSTANCES, \*TEST  
EQUIPMENT(ELECTRONICS)), (\*TRANSISTORS,  
ENCAPSULATION), TIMING CIRCUITS, RELAXATION  
OSCILLATORS, SEMICONDUCTOR DEVICES, PULSE  
AMPLIFIERS, THERMAL PROPERTIES (U)  
IDENTIFIERS: POWER CYCLERS (U)

THE REPORT DESCRIBES THE DESIGN AND OPERATION OF A  
SOLID-STATE POWER CYCLER USED IN THE EVALUATION OF  
PLASTIC ENCAPSULATED SEMICONDUCTOR DEVICES. THE  
CYCLER CAN SWITCH LOADS UP TO 2.0 KW WITH A  
VARIABLE DUTY CYCLE. THIS REPORT ALSO SHOWS THE  
PERFORMANCE OF THE CYCLER AS DESIGNED AND RECOMMENDS  
FUTURE MODIFICATIONS FOR ADDED VERSATILITY.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-727 680 6/8  
ARMY NATICK LABS MASS FOOD LAB

DEVELOPMENT OF A STABLE LEAVENING SYSTEM FOR  
BAKERY MIXES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAY 71 27P UMINA, ANTHONY ; KELLEY, NANCY  
; EVERSON, THOMAS ; WESTCOTT, DONALD E. ;  
REPT. NO. FL-123  
PROJ: PE-728012.12  
MONITOR: USA-NLABS TR-71-54-FL

UNCLASSIFIED REPORT

DESCRIPTORS: (\*FOOD, STORAGE); CARBON DIOXIDE;  
MOISTURE, TEMPERATURE, STABILITY, SODIUM  
COMPOUNDS, CARBONATES, PHOSPHATES, ALUMINUM  
COMPOUNDS, SEPARATION, ENCAPSULATION, PACKAGING,  
MILITARY REQUIREMENTS (U)  
IDENTIFIERS: \*CAKE MIXES, CAKE MIX SHELF LIFE,  
SODIUM BICARBONATES, SODIUM ALUMINUM PHOSPHATES,  
\*FOOD STORAGE (U)

IN ORDER TO PROLONG THE SHELF LIFE OF A PREPARED  
BAKERY MIX A LEAVENING SYSTEM WAS DESIRED WHICH WOULD  
PREVENT THE PREMATURE ESCAPE OF CARBON DIOXIDE DUE TO  
INTERACTION WITH MOISTURE IN THE PRODUCT DURING  
PROLONGED HIGH TEMPERATURE STORAGE. A VARIETY OF  
METHODS WAS TRIED WHICH WOULD PROVIDE A BARRIER  
BETWEEN THE SODIUM BICARBONATE AND THE LEAVENING  
ACID, SODIUM ALUMINUM PHOSPHATE, AND AVAILABLE  
MOISTURE IN THE MIX. THESE INCLUDED ENCAPSULATING  
THE SODIUM BICARBONATE PARTICLES WITH HYDROPHOBIC  
MATERIALS SUCH AS HYDROGENATED VEGETABLE OR ANIMAL  
OILS. THE SHORTENING PROTECTED SODIUM BICARBONATE  
METHOD WAS DEVELOPED INTO A TWO LAYERED BAKERY MIX,  
SEPARATING THE SODIUM BICARBONATE FROM THE MOISTURE  
CONTAINING INGREDIENTS OF THE MIX. PHYSICAL  
SEPARATION OF THE SODIUM BICARBONATE WAS ALSO  
INVESTIGATED BY PACKAGING THE SODIUM BICARBONATE IN A  
MOISTURE PROOF POUCH FROM WHICH IT COULD BE MIXED  
WITH THE REMAINING INGREDIENTS AT THE TIME OF BAKING.  
IT WAS FOUND THAT BOTH THE PHYSICALLY SEPARATED AND  
THE SHORTENING - PROTECTED SODIUM BICARBONATE IN A  
LAYERED MIX METHOD WERE SUCCESSFUL IN PREVENTING THE  
PREMATURE ESCAPE OF CARBON DIOXIDE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-729 680 8/7 20/11  
BATTELLE MEMORIAL INST COLUMBUS OHIO COLUMBUS LABS

THE EFFECT OF FLUIDS AND CYCLIC LOADING ON  
THE ELASTIC CONSTANTS OF ROCKS.

(U)

DESCRIPTIVE NOTE: SEMIANNUAL REPT. 18 DEC 70-18 JUN  
71,

AUG 71 39P. LA MORI, PHILLIP N. ;  
CONTRACT: HC210007, ARPA ORDER-1579

UNCLASSIFIED REPORT

DESCRIPTORS: (\*SEDIMENTARY ROCK, STRUCTURAL  
PROPERTIES), LOADING(MECHANICS), CRACKS,  
POROSITY, ELASTICITY, COMPRESSIVE PROPERTIES,  
ACOUSTIC PROPERTIES, EXPERIMENTAL DATA  
IDENTIFIERS: ACOUSTIC VELOCITY

(U)

(U)

SIMULTANEOUS MEASUREMENTS OF ACOUSTIC VELOCITY AND  
LINEAR STRAIN HAVE BEEN MADE ON SAMPLES OF SALEM  
LIMESTONE AND BEREA SANDSTONE. CYCLIC LOADING  
CONDITIONS OF 0-1-0-5-0-8-0 KB WERE MADE ON THESE  
SAMPLES. THE RESULTS SHOW THAT THIN CRACKS HAVE A  
LARGE EFFECT ON ACOUSTICALLY MEASURED PROPERTIES AND  
LITTLE EFFECT ON LINEAR STRAIN. BOTH ROCK SAMPLES  
ARE QUITE POROUS AND EXHIBIT THE CRUSHING MODE OF  
FAILURE; AT 1.5 KB FOR THE LIMESTONE, 5 KB FOR  
THE SANDSTONE. THIS CRUSHING GREATLY DECREASES THE  
STATIC MODULUS BUT CHANGES THE ACOUSTIC MODULUS ONLY  
SLIGHTLY. A PECULIAR KNEE DEVELOPS IN THE VELOCITY  
CURVE NEAR THE PRESSURE OF THE CRUSH-UP AND APPEARS  
TO BE AN INDICATOR OF IT. THE RESULTS SUGGEST THAT  
VOLUME MEASUREMENTS OF ELASTIC CONSTANTS ARE TO BE  
PREFERRED TO ACOUSTIC MEASUREMENTS FOR EVALUATING  
EXCAVATION OF ROCK. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-729 691 12/8  
SOUTHWEST RESEARCH INST SAN ANTONIO TEX

PREPARATION OF CAPSULES.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 1 AUG 70-31 JUL 71,  
SEP 71 8P ADAMS, LEON M. ;  
CONTRACT: N00014-71-C-0027  
PROJ: NR-356-509, SWRI-01-2928-01

UNCLASSIFIED REPORT

DESCRIPTORS: (ENCAPSULATION, REVIEWS),  
POLYVINYL ALCOHOL, PREPARATION, MATERIALS

(U)

A GOVERNMENT-FURNISHED MATERIAL WAS SUCCESSFULLY  
ENCAPSULATED, AND A NUMBER OF SMALL VIALS OF THE  
RESULTING CAPSULES WERE SUPPLIED TO THE OFFICE OF  
NAVAL RESEARCH FOR TESTING. THE BEST CAPSULE  
SHELL FORMULATION EVALUATED WAS PREDOMINANTLY  
POLY(VINYL ALCOHOL). (AUTHOR)

(U)



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DDC REPORT BIBLIOGRAPHY      SEARCH CONTROL NO, /ZZZHT

AD-770 908                      11/1  
NATIONAL CASH REGISTER CO DAYTON OHIO CAPSULAR PRODUCTS  
RESEARCH AND DEVELOPMENT

DEVELOPMENT OF MULTIPURPOSE CAPSULAR ADHESIVE  
SYSTEMS.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,  
MAY 71      60P      PETERS, GAVIN H. ; SCHAAB,  
CARL K. ; HILBELINK, RONALD D. ; DAVIS, TERRY  
R. ;

CONTRACT: DAAA21-68-C-0581

MONITOR: PA                      TR-4215

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ADHESIVES, PLASTICS), EPOXY  
PLASTICS, POLYESTER PLASTICS, AGING (MATERIALS),  
ENCAPSULATION, STABILITY, UNDERWATER

(U)

A UNIQUE, POLYESTER-EPOXY ADHESIVE SYSTEM WAS DEVELOPED WHICH CURES VERY RAPIDLY UPON MIXING OF ITS TWO COMPONENTS AND ADHERES TO A MULTITUDE OF SUBSTRATES UNDER VARIOUS ENVIRONMENTAL CONDITIONS. EACH OF THE TWO LIQUID ADHESIVE COMPONENTS CAN BE ENCAPSULATED TO FORM 'PSEUDO SOLIDS'. MIXING TOGETHER OF THE TWO CAPSULAR COMPONENTS INTO THE PROPER RATIO FORMS A STABLE, 'ONE CAN,' DRY POWDER ADHESIVE THAT IS EASILY ACTIVATED UPON RUPTURE OF THE CAPSULES. THIS RAPID CURING CAPSULAR ADHESIVE SYSTEM, WITH ITS IMPROVED STABILITY, HANDLING AND LOGISTICS CHARACTERISTICS DUE TO ENCAPSULATION, WAS FURTHER CHARACTERIZED DURING THE SECOND PHASE OF THE PROGRAM. CAPSULAR ADHESIVE STABILITY WAS FOUND TO BE NINE MONTHS UNDER LABORATORY CONDITIONS WITH THE EPOXY COMPONENT BEING THE LIMITING FACTOR. SEVERAL FORMULATION VARIATIONS WERE MADE THAT AFFECTED CURE TIME, BOND STRENGTH AND ADHESION PROPERTIES. ENCAPSULATION OF EACH OF THE TWO COMPONENTS WAS EASILY SCALED UP THROUGH THE PILOT-PLANT STAGE. SEVERAL MECHANICAL ADHESIVE APPLICATOR DESIGNS WERE DEVELOPED AND EVALUATED FOR THE EXTRUSION AND APPLICATION OF BOTH THE CAPSULAR ADHESIVES AND THE SAME FORMULATIONS IN THEIR LIQUID, UNENCAPSULATED FORMS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-804 551 9/1 9/5  
RADIO CORP OF AMERICA SOMERVILLE N J ELECTRONIC COMPONENTS  
AND DEVICES

TRANSISTOR, VHF, SILICON, POWER, LINEAR, 30-MHZ, 100  
WATTS PEP. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 65-30 JUN 66,  
DEC 66 123P ROSENZWEIG, R. ; CHANG, Z. F.

CONTRACT: DA-38-043-AMC-01387(E)  
PROJ: DA-1E6-22001-A-056  
MONITOR: ECOM 01387-F

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TRANSISTORS, \*VERY HIGH FREQUENCY),  
(\*POWER AMPLIFIERS, \*SILICON), ELECTRIC POWER  
PRODUCTION, GAIN, MODULATION, DISTORTION,  
CAPACITANCE, ELECTRICAL IMPEDANCE, RESISTORS,  
STORAGE, LIFE EXPECTANCY, RADIOFREQUENCY  
INTERFERENCE, ENCAPSULATION, SILICONE PLASTICS (U)

THIS REPORT DESCRIBES THE WORK PERFORMED IN THE  
DEVELOPMENT AND FABRICATION OF A LINEAR AMPLIFIER  
TRANSISTOR WITH A GOAL OF 100 WATTS PEP AT 30  
MEGAHERTZ WITH -30 DB INTERMODULATION DISTORTION,  
15-DB POWER GAIN, AND EFFICIENCY GREATER THAN 35  
PERCENT. THE TRANSISTOR STRUCTURE INCORPORATES  
DIFFUSED BALLAST RESISTANCE FOR SECOND-BREAKDOWN  
PROTECTION. A TEMPERATURE-COMPENSATING DIODE HAS  
BEEN PLACED INSIDE THE TRANSISTOR PACKAGE TO PROVIDE  
CLASS AB BIAS-POINT CONTROL. THE PACKAGE IS A  
UNIQUELY DESIGNED STUD PACKAGE HAVING SHORT, FLAT,  
LOW INDUCTANCE, ISOLATED TERMINALS. THERE ARE FOUR  
ISOLATED TERMINALS: THREE TERMINALS FOR THE  
TRANSISTOR AND ONE TERMINAL FOR THE DIODE. THE  
PILLET IS SEALED BY ENCAPSULATION IN A SILICON RESIN.  
PERFORMANCE DATA ON THE SUBMITTED FINAL SAMPLES  
REVEALS THAT 20 PERCENT OF THE TRANSISTORS WERE  
CAPABLE OF ATTAINING THE MAJOR GOAL OF 100 WATTS  
PEP WITH -30 DB INTERMODULATION DISTORTION.  
MEDIAN POWER GAIN ON SAMPLE TRANSISTORS WAS 14 DB  
AND COLLECTOR DIFFERENCES WERE NEAR 50 PERCENT. THE  
DEVICE WAS CAPABLE OF 150 WATTS DISSIPATION AT ROOM  
TEMPERATURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-815 470 9/5 13/8  
GENERAL DYNAMICS/POMONA CALIF

CORROSION PREVENTION/DETERIORATION CONTROL IN  
ELECTRONIC COMPONENTS AND ASSEMBLIES.

(U)

DESCRIPTIVE NOTE: FINAL SUMMARY ENGINEERING REPT.,  
66 152P SPARLING, R. H. ;  
REPT. NO. CR-6-347-958-001  
CONTRACT: DA-01-021-AMC-12641(Z)  
PROJ: DA-1400-A019

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ELECTRONIC EQUIPMENT; \*CORROSION  
INHIBITION); (\*RELIABILITY(ELECTRONICS);  
CORROSION INHIBITION); DEGRADATION, MATERIALS;  
PROCESSING; SELECTION, ENVIRONMENT, PROTECTIVE  
TREATMENTS, COATINGS, ENCAPSULATION, BONDING,  
SOLDERING, WELDING, PACKAGING

(U)

THE PURPOSE OF THIS DOCUMENT IS TO FOCUS THE  
ATTENTION OF DESIGNERS ON CORROSION AND THE  
CONSEQUENT DEGRADATION OF RELIABILITY OF ELECTRONIC  
ITEMS. THE REPORT POINTS OUT DANGEROUS  
COMBINATIONS OF MATERIALS AND PROCESSES, EMPHASIZES  
THE IMPORTANCE OF PROPER SELECTION OF MATERIALS, AND  
PROVIDES THE DESIGNER WITH MODERN TECHNIQUES FOR  
PREVENTION OF DETERIORATION. THE AIM OF THIS  
REPORT IS NOT TO DICTATE DESIGN, BUT TO HELP THE  
DESIGNER MEET ENVIRONMENTAL REQUIREMENTS.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-821 915 9/5 20/12  
WESTERN ELECTRIC CO INC NEW YORK

MICROWAVE DIODE RESEARCH.

(U)

DESCRIPTIVE NOTE: REPT. NO. 26 (FINAL), 10 JUN 65-9  
JUN 67,

OCT. 67 35P CICCOLELLA, D. F.; DE  
LOACH, B. C.; JR.; MARINACCIO, L. P.; MISAWA,  
T.; SMITH, K. D.;

CONTRACT: DA-28-043-AMC-01445(E)

PROJ: DA-1E6-22001-A-056

TASK: 1E6-22001-A-056-04

MONITOR: ECOM 01445-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH BELL  
TELEPHONE LABS., INC., WHIPPANY, N. J.

DESCRIPTORS: (•AVALANCHE DIODES; •MICROWAVE  
OSCILLATORS); MICROWAVE FREQUENCY, GERMANIUM,  
SILICON, ENCAPSULATION, CRYSTAL OSCILLATORS,  
MANUFACTURING METHODS

(U)

IDENTIFIERS: •IMPATT OSCILLATORS

(U)

THE WORK DESCRIBED IN THIS REPORT IS PART OF A  
BROAD PROGRAM OF CONTINUING THEORETICAL AND  
EXPERIMENTAL STUDIES TO ACHIEVE IMPROVED MICROWAVE  
SEMICONDUCTOR DIODES AND COMBINATION MICROWAVE  
DEVICES. OF IMMEDIATE PARTICULAR INTEREST IS THE  
RESEARCH AND DEVELOPMENT EFFORT DIRECTED TOWARD  
CLARIFYING THE RELATIONSHIP BETWEEN STRUCTURE AND  
BEHAVIOR OF AVALANCHE TRANSIT-TIME DIODE OSCILLATORS  
AND IMPROVING THEIR MICROWAVE PERFORMANCE. CHAPTER  
1 DESCRIBES EXPERIMENTAL WORK PERFORMED IN AN EFFORT  
TO OBTAIN MAXIMUM MICROWAVE CW OUTPUT FROM A SINGLE  
ENCAPSULATION, SPECIFICALLY BY USE OF SEVERAL SMALL  
SILICON WAFERS MOUNTED ON A COMMON PEDESTAL.  
CHAPTER 2 EXPLORES, ANALYTICALLY AND BY  
EXPERIMENTS, THE POSSIBILITIES OF OPERATING SEVERAL  
AVALANCHE WAFERS IN PARALLEL FOR HIGHER POWER AND/OR  
HIGHER EFFICIENCY. CHAPTER 3 SUMMARIZES AND PLACES  
IN PERSPECTIVE THE RESULTS ACHIEVED IN TWO YEARS'  
WORK ON THE PRESENT CONTRACT, WHICH HAS COVERED THE  
EVOLUTION OF AN EXPERIMENTAL DEVICE INTO AN  
EFFICIENT, RUGGED MICROWAVE SOURCE. (AUTHOR)

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-822 016 9/5  
WESTERN ELECTRIC CO INC NEW YORK

MICROWAVE DIODE RESEARCH.

(U)

DESCRIPTIVE NOTE: INTERIM REPT. NO. 4; 10 SEP 66-9 MAR 67;

OCT 67 JIP CICCOLELLA, D. F.; GIBBONS, G.; RULISON, R. L.;  
CONTRACT: DA-28-042-AMC-01445(E)  
PROJ: DA-1E6-22001-A-056  
TASK: 1E6-22001-A-056-04  
MONITOR: ECOM 01445-4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH BELL TELEPHONE LABS., INC., WHIPPANY, N. J.

DESCRIPTORS: (\*AVALANCHE DIODES, \*MICROWAVE OSCILLATORS), THERMAL STRESSES, SILICON, ENCAPSULATION, RADIOFREQUENCY POWER, GERMANIUM, SUPERHIGH FREQUENCY, EFFICIENCY, THERMAL PROPERTIES, PACKAGING

(U)

IDENTIFIERS: IMPATT (IMPACT AVALANCHE TRANSIT TIME)

(U)

WORK ON THE FABRICATION AND TESTS OF IMPROVED SILICON IMPATT OSCILLATORS IS DESCRIBED IN CHAPTER I. EFFORT HAS BEEN CONCENTRATED ON THE P-N DIODE STRUCTURE BECAUSE OF ADVANTAGES IN PROCESS YIELD AND IN DIODE PERFORMANCE. A NEW AND MORE RUGGED ENCAPSULATION HAS BEEN USED FOR MOST OF THE DIODES FABRICATED IN THIS PERIOD; THIS FACILITATES CIRCUIT MOUNTING AND THERMAL DESIGN. IN THIS ENCAPSULATION A SINGLE SILICON DIODE HAS PROVIDED 1500-MW CW OUTPUT POWER, AND MANY UNITS IN THE 4-TO 6-GHZ RANGE HAVE GIVEN POWER OUTPUT GREATER THAN ONE WATT. FABRICATION AND TEST RESULTS OBTAINED WITH GERMANIUM P-N IMPATT DIODES, SUPPORTED IN PART BY THE PRESENT CONTRACT, ARE REPORTED IN CHAPTER II. THIS WORK HAS RESULTED IN THE HIGHEST CW EFFICIENCY (12.1 PERCENT) SO FAR OBTAINED WITH IMPATT DEVICES, AND CW POWER OUTPUT IN EXCESS OF 500 MW AT 6 GHZ. THERMAL DISSIPATION PROBLEMS ARE MORE SEVERE WITH GERMANIUM THAN SILICON; THE AVERAGE BURNOUT TEMPERATURE APPEARS TO BE ABOUT 150 C. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-823 785 15/2  
STANFORD RESEARCH INST MENLO PARK CALIF

MICROENCAPSULATION.

(U)

DESCRIPTIVE NOTE: SPECIAL TECHNICAL REPT. NO. 17, APR  
64-JUN 67,  
JUN 67 94P BREEN, W. H. ; GIBSON, R.  
W. ; RADDING, S. B. ; SIRINE, G. F. ; BROWN, A.  
G. ;

CONTRACT: DA-18-035-AMC-122(A)  
PROJ: SRI-PAU-4900  
TASK: 1B522301A08101

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ENCAPSULATION, \*CHEMICAL WARFARE  
AGENTS), (\*DISSEMINATION, CHEMICAL WARFARE  
AGENTS), (\*CS AGENTS, ENCAPSULATION),  
POLYMERS, SOLUTIONS, POLYVINYL ALCOHOL,  
COATINGS, DRYING, SPRAYS, AIR, SOLVENTS,  
FREEZE DRYING

(U)

IDENTIFIERS: MICROENCAPSULATION

(U)

POTENTIAL CONTRIBUTIONS OF MICROENCAPSULATION TO  
DISSEMINATION SYSTEMS INCLUDE REDUCTION OF AGENT-  
HANDLING HAZARDS, PRESIZING, STABILIZATION BY  
ISOLATION, PROTECTION FROM HOSTILE ENVIRONMENTS, AND  
SUSTAINED RELEASE, AS WELL AS POSSIBILITIES FOR NEW  
SYSTEMS BASED ON IMPACTION CAPSULES OR LARGE,  
EXPLOSIVE-COATED, SELF-DISSEMINATING CAPSULES. IN  
THIS PROGRAM ENCAPSULATION OF A WIDE RANGE OF ACTIVE  
AND INACTIVE MATERIALS WAS CARRIED OUT USING NCR-  
TYPE PROCESSES TO ASSESS REAL CAPABILITIES AND  
LIMITATIONS FOR APPLICATIONS TO BOTH EXISTING AND NEW  
DISSEMINATION SYSTEMS. GENERIC PROCEDURES WERE  
DEVELOPED FOR ADAPTATION OF MICROENCAPSULATION TO NEW  
MATERIALS, PRIMARILY USING GELATIN OR POLYVINYL  
ALCOHOL (PVA) AS WALL MATERIALS, AND A VARIETY OF  
SPECIAL SAMPLES WAS PREPARED FOR EVALUATION STUDIES  
AT STANFORD RESEARCH INSTITUTE AND AT  
EDGEWOOD ARSENAL. MAJOR EFFORTS WERE DEVOTED  
TO PRODUCTION AND STUDY OF SUSTAINED- RELEASE  
INHALABLE CAPSULES, 1-10 MICROONS IN DIAMETER,  
PARTICULARLY IN RESPECT TO POSSIBILITIES FOR  
PROLONGED-EFFECT CS. CS CAPSULES WITH BOTH  
GELATIN AND PVA WALLS WERE PREPARED IN THIS SIZE  
RANGE AND CS RELEASE INTO AQUEOUS MEDIA WAS SHOWN  
TO BE CONTROLLABLE IN RATE OVER A RANGE TO TWO ORDERS  
OF MAGNITUDE LESS THAN FOR NONCAPSULAR CS.

(U)

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UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-827 272 15/2 7/4  
STANFORD RESEARCH INST MENLO PARK CALIF

RESEARCH STUDIES ON THE DISSEMINATION OF SOLID AND  
LIQUID AGENTS. (U)

DESCRIPTIVE NOTE: FINAL REPT. APR 64-DEC 67,  
DEC 67 138P POPPOFF, I. G. ; THUMAN, W.  
C. ;

CONTRACT: DA-18-035-AMC-122(A)  
PROJ: DA-18522301A081, SRI-PAU-4900  
TASK: 18522301A08101

UNCLASSIFIED REPORT

DESCRIPTORS: (CHEMICAL WARFARE AGENTS;  
DISSEMINATION); SOLIDS, LIQUIDS, AEROSOLS,  
EXPLOSIVE MATERIALS, ELECTROSTATICS, DETONATIONS,  
SHOCK WAVES, IGNITION, PYROTECHNICS, PYROLYSIS,  
OXIDATION, DEGRADATION, CONDENSATION, ULTRASONIC  
RADIATION, PNEUMATIC SYSTEMS, ENCAPSULATION,  
HYDROLYSIS, EQUATIONS OF STATE, ENTROPY,  
ATOMIZATION, POWDERS (U)

IDENTIFIERS: POINT-SOURCE DISSEMINATION (U)

THE OBJECTIVE OF THE PROGRAM WAS TO PROVIDE BASIC  
INFORMATION NECESSARY FOR AN OVERALL IMPROVEMENT OF  
CHEMICAL AGENT DISSEMINATION TECHNIQUES. STUDIES  
WERE MADE OF EXPLOSIVE GENERATIONS OF AEROSOLS  
(MECHANICS OF EXPLOSIVE PROCESSES; DETONATION,  
SHOCK, AND REACTION PROCESSES; IGNITION PROCESSES;  
COMMINUTION PROCESSES); THERMAL AND PYROTECHNIC  
GENERATION OF AEROSOLS (THERMAL AND PYROTECHNIC  
PROCESSES; PYROLYTIC AND OXIDATIVE DEGRADATION  
PROCESSES; CONDENSATION PROCESSES); ULTRASONIC,  
PNEUMATIC, AND ATOMIZATION PROCESSES; ELECTROSTATIC  
PHENOMENA ASSOCIATED WITH AEROSOL PRODUCTION; THE  
APPLICATION OF MICROENCAPSULATION TO AEROSOL  
GENERATION AND ENHANCEMENT; AND NATURAL AEROSOL  
GENERATION. A CRITICAL SUMMARY OF THE PROGRAM AND  
RECOMMENDATIONS FOR FUTURE WORK IS FIRST PRESENTED.  
THIS IS FOLLOWED BY A DISCUSSION OF ACCOMPLISHMENTS  
AND RECOMMENDATIONS FOR FUTURE RESEARCH IN EACH OF  
THE STUDY AREAS LISTED ABOVE, WITH REFERENCE TO  
PROGRAM REPORTS (22 SPECIAL TECHNICAL REPORTS  
AND 13 QUARTERLY PROGRESS REPORTS) FOR  
DETAILS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-838 791 9/1 13/8  
NAVAL AMMUNITION DEPOT CRANE IND

MICRO-NOTES. INFORMATION ON MICROELECTRONICS FOR  
NAVY EQUIPMENTS.

(U)

AUG 68 53P  
REPT. NO. NAD-CR-MICRO NOTES-25  
MONITOR: IDEP 515.00.00.00-X9-11

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY NAVAL AIR SYSTEMS  
COMMAND, WASHINGTON, D. C. AND NAVAL ELECTRONICS  
SYSTEM COMMAND, WASHINGTON, D. C.

DESCRIPTORS: (\*NAVAL EQUIPMENT;  
\*MICROMINIATURIZATION(ELECTRONICS));  
(\*SEMICONDUCTOR DEVICES, \*ENCAPSULATION);  
RELIABILITY(ELECTRONICS), EPOXY PLASTICS,  
TRANSISTORS, SEMICONDUCTORS, MILITARY  
REQUIREMENTS, INTEGRATED CIRCUITS, PLASTIC COATINGS,  
REPORTS

(U)

CONTENTS: RELIABILITY ASSESSMENT OF EPOXY  
TRANSISTORS; PRESENT RELIABILITY STATUS OF PLASTIC  
- ENCAPSULATED SEMICONDUCTORS AND AN EVALUATION OF  
THEIR POTENTIAL FOR USE IN MILITARY SYSTEMS;  
SUMMARY OF SIGNETICS PRESENTATION INCLUDING  
PROPOSED GENERAL SPECIFICATION; PLASTIC  
SEMICONDUCTORS; WESTINGHOUSE GOLDDIOLX INTEGRATED  
CIRCUITS OFFER MILITARY RELIABILITY IN PLASTIC  
PACKAGES; PLASTICS FOR SEMICONDUCTOR PACKAGING;  
RELIABILITY OF PLASTIC INTEGRATED CIRCUITS; G-12  
REPORT ON 'PLASTIC' INTEGRATED CIRCUITS; PLASTIC/  
EPOXY SEMICONDUCTORS; USE OF PLASTIC ENCAPSULATED  
TRANSISTORS AT HAZELTINE; AN EVALUATION OF  
PLASTIC ENCASED SEMICONDUCTORS; SELECTION AND  
CONTROL OF PLASTICS FOR SEMICONDUCTOR PACKAGING;  
PLASTIC MICROCIRCUIT RELIABILITY; SUMMARY OF  
PRESENTATION ON PLASTIC ENCAPSULATED TRANSISTORS;  
SUMMARY OF PRESENTATION ON PLASTIC ENCAPSULATED  
TRANSISTORS; POSITION OF THE NAVAL APPLIED  
SCIENCE LABORATORY ON THE MILITARY USE OF PLASTIC  
ENCAPSULATED SEMICONDUCTOR DEVICES; AN R AND D  
PROGRAM TO DEVELOP POLYMERIC ENCAPSULANTS FOR SOLID  
STATE ELECTRONIC COMPONENTS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-846 071 9/1 13/8  
NAVAL AMMUNITION DEPOT CRANE IND

MICRO NOTES. INFORMATION ON MICROELECTRONICS  
FOR NAVY EQUIPMENTS.

(U)

JAN 69 82P  
REPT. NO. NAD-CR-MICRO NOTES-27  
MONITOR: IDEP 515.00.00.00-X9-13

UNCLASSIFIED REPORT

DESCRIPTORS: (\*NAVAL EQUIPMENT;  
\*MICROMINIATURIZATION(ELECTRONICS));  
(\*SEMICONDUCTOR DEVICES, \*ENCAPSULATION),  
RELIABILITY(ELECTRONICS), EPOXY PLASTICS,  
TRANSISTORS, SEMICONDUCTORS, INTEGRATED CIRCUITS,  
PLASTIC COATINGS, REPORTS

(U)

IDENTIFIERS: AN/AWS-27, METAL OXIDE  
SEMICONDUCTORS, AVIONICS

(U)

THE REPORT IS AN EFFORT TO DISSEMINATE INFORMATION  
ON EVALUATION, APPLICATION, AVAILABILITY, RESEARCH  
AND DEVELOPMENT, AND STANDARDIZATION ACTIVITY  
PERTAINING TO STATE-OF-THE-ART MICROELECTRONIC  
CIRCUITS, DEVICES, AND MATERIALS, WITH A VIEW TOWARD  
AVOIDING DUPLICATION OF EFFORT AND MAKING MAXIMUM USE  
OF TECHNICAL RESOURCES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-849 285 11/4 20/13  
MONSANTO RESEARCH CORP ST LOUIS MO

RHEOLOGY OF ROD-LIKE PARTICLES IN VISCOUS  
MEDIA. PART I. FORMATION OF COMPOSITES  
FROM SINGLE FIBERS;

(U)

FEB. 69 46P TAKANO, MASAHARU ;  
REPT. NO. N00014-67-C-0218  
CONTRACT: N00014-66-C-0218, ARPA ORDER-873  
PROJ: NR-356-484

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON MONSANTO/WASHINGTON  
UNIV., ARPA ASSOCIATION PROJECT DEVELOPMENT OF HIGH  
PERFORMANCE COMPOSITES.

DESCRIPTORS: (COMPOSITE MATERIALS, MANUFACTURING  
METHODS), GRAPHITE, BORON, CARBON FIBERS,  
FIBERS, GLASS TEXTILES, RHEOLOGY, ANISOTROPY,  
SCATTERING, MATHEMATICAL MODELS, ENCAPSULATION,  
MECHANICAL PROPERTIES, DENSITY, EPOXY PLASTICS,  
SOLVENTS

(U)

THE TECHNIQUE DEVELOPED FOR PREPARING MOLDING  
COMPOUNDS OF HIGH MODULUS FIBERS BY ENCAPSULATING  
BUNDLES OF SHORT FIBERS WITH RESIN IS DIFFICULT TO  
APPLY TO INDIVIDUALLY DISPERSED FIBERS.  
PRELIMINARY MODEL STUDIES CARRIED OUT ON SHORT  
GLASS FIBERS HAVE DEMONSTRATED THAT THE CRITICAL  
CONCENTRATION FOR PROCESSING SINGLE FIBERS, RATHER  
THAN FIBER BUNDLES, IS VERY LOW IN AQUEOUS SYSTEMS,  
BUT CAN BE SIGNIFICANTLY INCREASED BY USE OF VISCOUS  
MEDIA AND HIGH RATES OF SHEAR. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-854 306 9/1  
AUTONETICS ANAHEIM CALIF

INVESTIGATION OF PLASTIC EFFECTS ON  
SEMICONDUCTOR RELIABILITY.

(U)

DESCRIPTIVE NOTE: FINAL REPT., 22 DEC 67-31 DEC 68,  
MAY 69 IGIP VALLES, A. C. ; ANDERSON, R.

J. ;

REPT. NO. C8-387/501

CONTRACT: F30602-68-C-0125

PROJ: AF-5519

TASK: 551904

MONITOR: RADC, IDEP

TR-69-82,742.00.00.00-F9-01

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TRANSISTORS,  
RELIABILITY(ELECTRONICS)), (\*EMBEDDING  
SUBSTANCES, CHEMICAL CONTAMINATION), TRANSISTORS,  
EPOXY PLASTICS, SILICONE PLASTICS, IMPURITIES,  
IONS, FAILURE(ELECTRONICS), STRESSES,  
ENCAPSULATION

(U)

THE OBJECTIVE OF THE PROGRAM WAS TO STUDY THE  
EFFECTS PRODUCED WHEN IONS PURPOSELY WERE INTRODUCED  
INTO PLASTICS AND USED ON TRANSISTORS. A MATERIALS  
SURVEY RESULTED IN THE SELECTION OF SEVERAL CANDIDATE  
HIGH PURITY EPOXY RESINS AND SEMICONDUCTOR GRADE  
SILICONE COATINGS. THESE PLASTICS WERE THEN  
SCREENED USING MECHANICAL, PHYSICAL, AND CHEMICAL  
TESTS. ONE EPOXY AND ONE SILICONE WERE SELECTED  
FOR FURTHER FUNCTIONAL TESTING AS SEMICONDUCTOR  
COATINGS. A METHOD WAS DEVELOPED FOR DOPING THE  
TWO SELECTED RESINS WITH IONS BY DISPERSING THEREIN  
METAL SALTS OF ORGANIC ACIDS OF ORGANO-METALLIC  
COMPOUNDS. DOPANTS WERE ORGANIC SALTS OF SODIUM,  
MAGNESIUM, ZINC, OR AN ORGANO-METALLIC COMPOUND  
CONTAINING CHLORIDE IONS. THE DOPED PLASTICS WERE  
THEN APPLIED AND CURED OVER TEST NPN TRANSISTORS.  
THE EFFECTS OF EACH ION ON THE TRANSISTOR  
PARAMETERS WERE ASCERTAINED AFTER SUBJECTING THE  
DEVICES TO ELEVATED TEMPERATURE-REVERSE BIAS AND HIGH  
HUMIDITY REVERSE BIAS STRESSES. (AUTHOR)

(U)

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UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

CORPORATE AUTHOR - MONITORING AGENCY

\*AIR FORCE CAMBRIDGE RESEARCH LABS L G  
HANSCOM FIELD MASS

\*\*\*  
AFCRL-71-0151  
MICROENCAPSULATED CLOUD SEEDING  
MATERIALS.  
AD-722 448

\*AIR FORCE OFFICE OF SCIENTIFIC  
RESEARCH ARLINGTON VA

\*\*\*  
AFOSR-1001  
ANALOG COMPUTER RESEARCH INTO  
THE ENERGY-EXCHANGE BETWEEN GASES  
AND SOLIDS.  
AD-605 159

\*AIR FORCE WEAPONS LAB KIRTLAND AFB N  
MEX

\*\*\*  
AFWL-TR-64-167  
ENCAPSULATION OF VIRUSES.  
AD-620 933

\*ARMY ELECTRONICS COMMAND FORT  
MONMOUTH N J

\*\*\*  
ECOM-01387-F  
TRANSISTOR, VHF, SILICON,  
POWER, LINEAR, 30-MHZ, 100 WATTS  
PEP.  
AD-804 551

\*\*\*  
ECOM-01424-2  
LOW COST INTEGRATED CIRCUIT  
TECHNIQUES.  
AD-631 491

\*\*\*  
ECOM-01424-3  
LOW COST INTEGRATED CIRCUIT  
TECHNIQUES.  
AD-635 183

\*\*\*  
ECOM-01445-F  
MICROWAVE DIODE RESEARCH.  
AD-821 915

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ECOM-01445-4  
MICROWAVE DIODE RESEARCH.  
AD-822 016

ECOM-01524-4  
RESISTORS FOR MICROPOWER  
CIRCUITS.  
AD-489 906

\*\*\*  
ECOM-2879  
PRELIMINARY INVESTIGATION OF  
PLASTIC ENCAPSULATED TRANSISTORS.  
AD-660 349

\*\*\*  
ECOM-3410  
1.5-KW SOLID-STATE POWER  
CYCLER.  
AD-726 018

\*ARMY ELECTRONICS LABS FORT MONMOUTH N  
J

\*\*\*  
ER E 1101  
ENCAPSULATING RESINS AND  
POTTING COMPOUNDS  
AD-096 112

\*ARMY NATICK LABS MASS FOOD LAB

\*\*\*  
FL-133  
DEVELOPMENT OF A STABLE  
LEAVENING SYSTEM FOR BAKERY MIXES.  
(USA-NLABS-TR-71-54-FL)  
AD-727 680

\*ARMY NATICK LABS MASS

\*\*\*  
USA-NLABS-TR-71-54-FL  
DEVELOPMENT OF A STABLE  
LEAVENING SYSTEM FOR BAKERY MIXES.  
AD-727 680

\*AUTONETICS ANAHEIM CALIF

\*\*\*  
C8-387/501  
INVESTIGATION OF PLASTIC  
EFFECTS ON SEMICONDUCTOR  
RELIABILITY.  
(RADC-TR-6C-82)  
AD-854 306

\*BATTELLE MEMORIAL INST COLUMBUS OHIO  
COLUMBUS LABS

\*\*\*  
THE EFFECT OF FLUIDS AND CYCLIC

UNCLASSIFIED

BEL-GEN

LOADING ON THE ELASTIC CONSTANTS OF  
ROCKS.  
AD-729 680

\*BELL TELEPHONE LABS INC WHIPPANY N J  
\* \* \*  
ENGINEERING SERVICES ON  
TRANSISTORS  
AD-261 938

\*BUREAU OF NAVAL WEAPONS WASHINGTON D  
C  
\* \* \*  
NAVWEPS-7604  
EFFECT OF PROCESS VARIABLES ON  
THE DIMENSIONS AND QUALITY OF  
EXTRUSION-COATED PROPELLANT GRAINS  
AD-255 962

\*CLEVITE TRANSISTOR PRODUCTS WALTHAM  
MASS  
\* \* \*  
PRODUCTION ENGINEERING MEASURE  
FOR THE IMPROVEMENT OF GERMANIUM  
ALLOY POWER TRANSISTORS.  
AD-604 196

\*DEFENSE DOCUMENTATION CENTER  
ALEXANDRIA VA  
\* \* \*  
DDC-TAS-70-39-1  
PACKAGED CIRCUITS. VOLUME I.  
AD-704 925

\*DEPUTY COMMANDER AEROSPACE SYSTEMS  
INGLEWOOD CALIF  
\* \* \*  
DCAS-TDR62 5  
CRYSTAL GROWTH AND  
CRYSTALLOGRAPHY. A LITERATURE  
SURVEY  
AD-274 642

\* \* \*  
TDR62 5  
CRYSTAL GROWTH AND  
CRYSTALLOGRAPHY. A LITERATURE  
SURVEY  
(DCAS-TDR62 5)  
AD-274 642

\*DOUGLAS AIRCRAFT CO INC SANTA MONICA

CALIF MISSILE AND SPACE SYSTEMS  
DIV

\* \* \*  
SM-48410  
STRESS ANALYSIS OF  
ENCAPSULATION MATERIALS FOR WELDED  
MODULES,  
AD-628 833

\*ELECTRONIC SYSTEMS DIV L G HANSCOM  
FIELD MASS  
\* \* \*  
ESD-TDR-64-630  
LEAD ATTACHMENT AND  
ENCAPSULATION TECHNIQUES FOR THIN  
FILM MICROCIRCUITS,  
AD-611 752

\*GENERAL DYNAMICS/CONVAIR SAN DIEGO  
CALIF  
\* \* \*  
GDC-BTD67-144  
THERMAL ANALYSIS. ADVANCED  
AUTOPILOT FLATPAK MODULE DESIGN  
RECOMMENDATIONS,  
(SAMSO-TR-71-86)  
AD-722 405

\*GENERAL DYNAMICS/POMONA CALIF  
\* \* \*  
CR-6-347-958-001  
CORROSION  
PREVENTION/DETERIORATION CONTROL IN  
ELECTRONIC COMPONENTS AND  
ASSEMBLIES.  
AD-815 470

\*GENERAL ELECTRIC CO SYRACUSE N Y  
\* \* \*  
OPTIMIZATION OF THERMOELECTRIC  
ENERGY CONVERTERS  
AD-265 461

\* \* \*  
OPTIMIZATION OF THERMOELECTRIC  
ENERGY CONVERTERS  
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13. ABSTRACT  Encapsulation used as a protective covering for electronic circuits, insulation from moisture and heat, and lacquer film and thin film coatings of capacitors, is the subject of this bibliography. References dealing with failures, cracks, and deterioration effects are amply represented.  Corporate Author-Monitoring Agency, Subject, Title, and Personal Author Indexes are included.			

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